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ABSTRACT

The first volume details the procedures used in second, fourth, and sixth grades and inservice training projects and their results; the second presents data on achievement, attitude, and interaction analysis. The purpose of the project was to test some theoretical principles of teacher influence with particular emphasis on different patterns which occur in different teaching situations. The four main objectives were 1) to collect normative data; 2) to analyze verbal interaction patterns, at three grade levels, in classrooms that score above and below average in pupil achievement and positive pupil attitudes; 3) to develop procedures and equipment to tabulate coded interaction data directly into a matrix; and 4) to work with a small group of teachers to help them modify their teaching behavior and to identify models of classroom interaction. The results are discussed in detail under four headings: 1) teaching effectiveness as a field of knowledge; 2) helping a teacher change his teaching behavior; 3) outlining the contributions which the project makes for those who conduct research; and 4) describing some of the contributions of this project for the classroom teacher. Appendixes to volume 1 include the achievement and attitude tests used for each grade, the inservice training instruments, and the analysis of covariance for the sixth grade. (MBM)

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Final Report

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Volume I of II Volumes

TEACHER INFLUENCE PATTERNS AND PUPIL ACHIEVEMENT IN THE SECOND, FOURTH, AND SIXTH GRADE LEVELS

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PREFACE TO VOLUMES I AND II

This terminal contract report consists of two volumes. The first volume describes the procedures used in our second, fourth, sixth grade, and inservice training projects and then presents the results. The second volume is a data bank in which achievement, attitude, and interaction analysis data are stored.

Contract research projects provide professor and graduate student alike with resources. The professor realizes independence, research opportunity, and headaches; the graduate student obtains experience, income, and fatigue. Many different individuals had some part to play in this total effort. The list includes elementary children, high school students, undergraduate and graduate university students, engineers, project secretaries, teachers, other professors, and so on. To nearly all of them the senior staff expresses its sincere gratitude and to the others, the ones who provided clever delaying tactics and problems to be solved, we can only say that we savored the challenge.

This report involves one matter of style which should be clarified. The tabled data and printed steps in statistical analysis are minimal. Some readers, of course, will object because we have "not provided sufficient information for another research scholar to verify our conclusions" should he so desire. We chose this style because most of our readers are not interested in extensive displays of data and details at each step in statistical analysis. To compensate for this blaspheme, the complete data and computer print-outs of our statistical procedures will be made available to those who can pay for the Xerox costs. We will keep our records intact for a number of years and those who care enough to make the effort and who know enough to ask clear questions can obtain additional information by writing to the Project Director. Professional critics, of course, will have special needs in terms of access to the data. All are invited to make inquiries.

At each grade level we collected and stored much more data than are reported. For example, very little has been done, so far, with the data in subscripted categories. We have also many more composite matrices and time-use breakdowns than can be found in Volume II. This is especially true of the fourth grade in which we have more kinds of matrices than we had space for printing. The senior research associates at each grade level worked much harder than this report indicates. Each wrote his own special report and these have been combined into a single chapter in Volume I. This can only be done by asking what is most relevant and ruthlessly discarding everything else.

Ned A. Flanders
Ann Arbor, 1970

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Chapter One

THE OBJECTIVES OF THE ORIGINAL PROJECT AND THE EXTENT TO WHICH THESE OBJECTIVES HAVE BEEN ACCOMPLISHED

The Main Objectives of the Contract

There are four main objectives in the contract for this project. These are: (a) to collect normative data; (b) to analyze verbal interaction patterns, at three grade levels, in classrooms that score above and below average in pupil achievement and positive pupil attitudes; (c) to develop procedures and equipment in order to tabulate coded interaction data directly into a matrix; and (d) to work with a small group of teachers in order to help them modify their teaching behavior which, in turn, will help to identify models of classroom interaction. These essential features of the contract are described below as they were originally written in the "Abstract" of the contract.

Abstract of the Proposal.

The purpose of this project is to test some theoretical principles of teacher influence in the sixth, fourth and second grade levels with particular emphasis on different patterns of teacher influence which occur in different teaching situations.

The four main objectives are: (1) to establish normative data for teacher influence patterns at the three grade levels of the elementary classroom by applying the technique of interaction analysis and tabulating the data separately for different teaching situations; (2) given a group of classes in which the attitudes and content achievement of the pupils are above average, compared with another group of classes in which these measures are below average, we hypothesize that in the above average classrooms - a) more indirect teacher influence will occur when new material is being introduced and when the diagnosis of difficulties occurs, b) more direct teacher influence will occur at the later stages of classroom learning cycles, c) more flexible patterns of teacher behavior will occur across different teaching situations, and d) more indirect influence will occur during all phases of teaching; (3) to develop a prototype apparatus for tabulating interaction analysis data directly into matrices; and (4) to select a small non-representative sample of teachers whose natural style of teaching is more flexible and whose pupils score above average on measures of constructive attitudes and content achievement -- to expose these teachers to specialized training in an effort to have them demonstrate patterns of interaction which will help us develop models of teacher influence for different teaching situations which occur at these grade levels.

The procedure to be followed for objectives one and two will require a representative sample of teachers at each grade level studied. A pupil attitude inventory will be administered to approximately 40 classes and a frequency distribution made of the class averages. About 15 classes representing the top, middle and bottom of this distribution will be selected. Pre-and-post achievement tests covering reading, arithmetic and writing or English will be administered to the selected classes delineating a six-month learning period. During this learning period extensive observation using interaction analysis will provide data for testing the four hypotheses mentioned in objective two. During the first year this general procedure will be carried out with sixth-grade classes; during the second year with fourth-grade classes; and during the third year with second-grade classes.

During the fourth year a non-representative group of about 15 teachers will be selected because of unusual talent in flexible teaching style and because their classes scored above average on the pupile attitude inventory and achievement tests. These teachers will participate in a training program designed to accentuate those patterns of teaching which, in general, seemed more characteristic of teachers whose students were above average on attitude and achievement measures. These teachers will be observed after training and the resulting interaction analysis data will be used to construct models of teacher influence in different teaching situations which occur normally in the elementary grades. This fourth year is an effort to overcome the limitation of studying average teachers who merely demonstrate existing practices rather than the best methods of teaching.

Subjective Overview of the Results in Terms of the Four Objectives.

The four objectives of the project and the procedures for reaching them can be considered to be requirements in a research contract. From this perspective, it can be said that the contract is satisfied because the procedures agreed upon within the contract were completed within tolerable limits. However, research results involve much more than merely meeting the requirements of a contract. The extent to which any objective is reached is a matter of degree. In this section the objectives are reviewed in terms of those activities which went exceptionally well and produced results which exceeded expectations; on the other hand, some activities ran into difficulties and barely satisfied the minimum contractual specifications.

The Objective of Collecting Normative Data.

The definition of normative data used in the proposal (Flanders, 1963, p. 6) -- "to determine a set of N^2 probabilities for pairs of events, for different types of elementary classroom instructional periods such as reading, arithmetic, science, social studies, etc., as a commentary on existing conditions of teacher influence in the classroom. This inference is dependent on representative sampling." In this definition, the probability of a pair of events refers to the relative frequency of 100 possible pairs of coded verbal statements which can be obtained by using the ten Flanders Interaction Analysis Categories (FIAC). The display is in the form of 10X10 matrices adjusted to a common base of 1,000 events.

What is meant by normative:-- A norm is a score for some variable which would be expected to occur in a particular population which can be described. In the case of interaction analysis, one can ask what are the chances that a teacher question--Category Four--will be followed by silence--Category Ten--in a sixth grade, self-contained classroom when arithmetic is being taught? The answer can be found in a total cumulative matrix for all of our sixth-grade teachers who were observed teaching arithmetic. The number in the (4-10) cell indicates the incidence of this pair of verbal events per 1,000 coded symbols. The total number of coded symbols, on which this estimate is based, is printed at the bottom of the matrix. An estimate of the total hours during which teachers in our sample were observed teaching arithmetic can be made by dividing this number by 1,200 which is the approximate number of tallies usually recorded in one hour.

Representativeness:--The example in the previous section seems simple and straightforward, but there are some very bothersome problems to be taken into consideration if we are to qualify the answers to such sampling questions. These bothersome problems arise when it is recognized that the utility of a norm depends on the relationship between how the norm was created and the purposes of the person who wishes to use it. Some of these problems are now discussed.

First, it is clear that there is not one sampling procedure involved in collecting interaction analysis data; instead, there are several. One can consider the teacher-classroom as the unit of sampling and ask whether the classes visited are representative of a population of classroom units. Next, in self-contained classes there are many different kinds of learning activities such as arithmetic, social studies, science, and so on. One can ask whether the data collected during the teaching of arithmetic is representative of all arithmetic teaching in that classroom. In addition, is the proportion of data from arithmetic instruction, in relation to the other kinds, the same in the sample as it is in all classroom instruction? Next, within a particular learning activity there are different phases of learning, such as the introduction, the work period, and the terminal activities. One can ask whether the observed phases of learning are or are not representative of the interaction in all such learning phases and are they proportionally representative. Finally, one can consider the single coded event as the unit of sampling. Here the population being sampled can be considered to be infinite for all practical purposes. There is some evidence to suggest that somewhere near six or seven thousand tallies, proportional frequencies within an interaction matrix become quite stable. One generalization to be made here is that representativeness in terms of one unit of sampling does not ensure representativeness in another. Similarly, the most effective sampling procedures for one kind of universe may not be the most effective for another.

Second, the research design requirements for testing the hypotheses of this project may be met most effectively by purposely using a non-representative sample. Here we are concerned with creating a contrast between pseudo treatment conditions such that we provide an efficient and fair test of the hypotheses. Thus, if the hypotheses refer to comparing more indirect with more direct teachers, then two groups of teacher-classrooms units may be selected such that this feature of classroom interaction is purposely in contrast. At the same time, other factors which influence classroom interaction would have to be controlled and/or become part of the data analysis. The sampling procedures which will produce this contrast and thereby provide the most adequate and fair test of the hypotheses may, at the same time, reduce the representativeness of the sample in terms of one or more universes. Extending this line of reasoning further, it might be wise to control the average ability of the class, to insist that the instructional materials and the teaching objectives be common to all classes, and to control the total time spent on instruction so that it is approximately the same for the participating classes.

In the present project, the second set of considerations was often in conflict with the first. In fact, the final procedure used in each of the three grade levels, illustrates different resolutions of these issues. In the sixth grade, subsequent reading in this report will show that the sample of teacher-classroom units was the product of a procedure which tended to make these units representative of a larger, designated population. In the sense of representing sixth grades in general, the procedure of selecting the sample is more defensible, compared with the fourth and second grades.

The fourth grade sample was more highly controlled. All of the fourth-grade teachers in one school district (N=72) participated in the initial step of administering a pupil attitude inventory. Instructional materials for a particular social studies two-week unit of study were produced and used. There were some teachers who were afraid to withdraw from the project, even though this option was present, so that a factor such as voluntary participation was less likely to bias the sample in the fourth grade. In this design, it was possible to study the introductory, middle work, and final terminal phases of the instruction. Thus the fourth grade sample was quite different, compared with the sixth.

The second grade sample presented us with yet another problem. The range of reading ability among the pupils was too large and the average too low to permit the efficient use of a pupil attitude inventory in order to select the teacher-class units. In this case, the procedures specified in the proposal simply turned out to be inappropriate. Our response was to invite teachers, in the three closest school districts, to participate in the project and the classes observed were accepted in the order in which the teachers volunteered. This procedure is not defensible in terms of systematic sampling.

Volunteering to participate:--Teachers had greater freedom to volunteer or to avoid participation in the sixth and second grade samples, compared with the fourth grade. This undoubtedly influences yet another aspect of the representativeness of the data. Teachers may distrust the observer who comes into a classroom to code verbal interaction and these teachers are probably more likely to put on an act which, by its very nature, is different from the usual classroom interaction. Ironically, the more rigorous the sampling procedure, the more likely that a teacher may be found in the sample who does not wish to participate. In turn, this teacher may alter his behavior more than a volunteer. Thus, the more rigorous procedure may produce less representative classroom interaction data. The factor of bringing in the instructional materials for a two-week unit of study, used in the fourth grade, undoubtedly has some unknown effect on the teacher's natural style. The effect is probably to make between class interaction more alike, restricting the range of natural differences that would otherwise exist.

Summary of representativeness:--It is the opinion of our staff that the sixth grade data provide the most accurate picture of normative interaction patterns that reflect common teaching practice. Next would be the fourth, and the last would be the second grade. Probably the fourth grade sample provided the best setting for the test of our hypotheses because the instructional materials, length of teaching time, and measures of achievement were better controlled. The second grade sample carries the poorest recommendations in the sense that no systematic sampling procedure was used to select the teacher-classroom units nor to control the instructional materials.

The specifications of the original proposal were exceeded in the sixth and fourth grade samples. Both the number of classes in which the pupil attitude inventory was administered and the number of classes observed were greater than called for in the contract. In addition, data from two Minnesota studies in eighth grade mathematics and seventh grade combined English-social studies are also included in the report of this study. These inclusions broaden the base for making generalizations.

The Objective of Relating Interaction Analysis Variables with Achievement and Attitude.

Four hypotheses were made with regard to classrooms in which measures of content achievement and pupil attitudes were high compared with classes in which the same measures were low. Because of the differences in sampling, already noted, these four hypotheses were not tested equally well in all three grade levels.

New material and diagnosing difficulties:--It was hypothesized that teachers in the higher achieving classes would be more indirect when new material was being introduced and when learning difficulties were being diagnosed.

The second part of this hypothesis, that is, separately analyzing classroom interaction patterns when learning difficulties were diagnosed was a failure at all three grade levels. The principal cause of this failure was that the data were not accessible. First, episodes of this type occurred very infrequently. Second, most diagnosis occurred in the form of private contacts between a teacher and one pupil. Usually the conversations could not be heard and therefore could not be coded by our observers.

The analysis of classroom interaction analysis when new material was introduced was most effective in our fourth grade design. By controlling the instructional materials and restricting teachers to ten days of teaching, it was much easier for our observers to distinguish between periods when new material was introduced and when this was not so. Our attempts to make these distinctions at the sixth and second grade levels were not accurate enough to justify a special analysis.

Latter stages of the learning cycles:--What has just been said about periods when new material was introduced can also be said about the latter stages of learning cycles. These periods were clearly present during the last two days of the ten-day unit of study used in the fourth grade. Near the end of the unit teachers were concerned with summarizing and permitting pupils to give reports about what they had learned. The interaction analysis data could therefore be separated for analysis and the hypothesis tested.

Indirectness and flexibility:--The third and fourth hypotheses about flexibility of teacher influence and overall indirectness were hypotheses which could be tested at all three grade levels.

General indirectness was no problem because it can be quantified by using variables that are derived from the FIAC coding system.

Flexibility could be tested by comparing interaction patterns during different subject matter periods. However, during the fourth year of the project a Ph.D. thesis by Miller (1969) provided a new way of quantifying the flexibility variable. This made it possible to reanalyze the earlier data and make a second test of this hypothesis.

Assessing achievement and pupil attitudes:--The method of measuring achievement in the sixth and second grade levels consisted of adapting sections of nationally standardized achievement tests. Sections concerned with arithmetic, arithmetic reasoning, vocabulary, etc., were used for this purpose. In the fourth grade, the unit of study was on the country of New Zealand. An achievement test was specially designed to assess both memory of factual material and generalizations about land use.

It would appear that a specially designed test covering the material taught is a superior method of assessing average class achievement in this research design. The difficulty of adapting nationally standardized tests has several facets. First, the material taught in the classroom usually is not the same material that appears in the test. Second, the learning activities of pupils during periods other than those observed in the classroom are more likely to influence performance on the nationally standardized tests than performance on the New Zealand test. Third, due to errors of judgment, there was a more pronounced ceiling effect on pupil performance with the nationally standardized tests. Here we made the mistake of selecting tests for the same grade level as our pupils and the normative expectations of the publisher were apparently out of date. These factors would tend to weaken the relationship between achievement and classroom interaction variables, assuming that such relationships exist. Unfortunately, the use of instructional materials and more coercion toward participation made the fourth grade teachers more cautious so that the interaction analysis variables had less variance than we would have preferred. These are factors which make research in this area difficult.

The assessment of pupil attitudes proceeded more smoothly in the sixth and fourth grade levels. The difficulty with reading skills in the second grade, already mentioned, made this assessment very difficult at the lower age level. At first we assumed that no test of pupil attitudes could be used. However, one of our more enterprising staff members kept working on a very simple questionnaire for a different study. In this questionnaire were five items which were quite similar to the items in our longer pupil attitude inventory. We used the combined score on these items to calculate an average for class attitude.

Lack of cause-and-effect relationships:--The relationships between interaction analysis variables and measures of pupil growth are statistical associations which do not clarify causes. Whether bright pupils who tend to learn more permit a teacher to behave more indirectly or whether more indirect behavior, on the part of the teacher, causes pupils to learn more is not determined in these studies.

For a number of reasons which are not cited here, our research staff is disposed to believe that teachers can influence classroom interaction even more than pupils can. We also believe that teachers should strive toward more effective teaching patterns because they are professionals who are paid to do so.

Summary:--At each grade level there are differences in sampling and measurement which would tend to reduce or increase the chances of finding significant relationships between interaction analysis variables and measures of pupil growth. To obtain some perspective in judging the validity of the findings herein reported, the reader is referred to Chapter XII in Flanders (1970). The fourth grade data appears to offer the best opportunity to test the hypotheses which are investigated in this project even though the range of interaction analysis variables is restricted at this grade level.

In order to take advantage of the Minnesota seventh and eighth grade samples from an earlier project, a special stepwise, linear regression analysis was carried out. Thus, in seeking to investigate relationships between variables based on classroom verbal interaction and average class measures of pupil achievement and attitude, the contractual requirements of this project are exceeded by incorporating the additional data. The net effect of this move was to broaden the base for making generalizations about these relationships.

The Objective of Developing Procedures and Equipment to Tabulate Directly Into a Matrix.

No matter how theoretical may be the goals of the research in which procedures are developed for the systematic coding of classroom interaction, there exists a possibility that the coding techniques may turn out to be very useful in helping teachers improve classroom instruction. In a program to improve instruction, interaction analysis data may be used as a source of feedback information for teachers. In this application, it would seem helpful if a display of the data, such as a matrix, could be ready at the instant the encoding procedures are completed. If the goal of instant feedback could not be reached, then quick and automatic processing of the interaction data would be the next most desirable alternative. The third objective of this project refers to these problems.

There were three lines of activity which were carried out with respect to this objective. Each is discussed in turn.

A portable matrix tabulator:--The first effort toward this objective consisted of designing and fabricating a direct coding matrix tabulator which an observer could use to tabulate directly onto a printed matrix form with a pencil. The essential feature of this mechanism was to provide a signal which indicated the correct row on which the next tally should be marked.

Three electrical circuits were designed. The first consisted of a battery operated set of light-weight D.C. relays which switched on lights that, in turn, shown through the paper. The lighted row for the next tally was activated by having the pencil touch a rod which indicated the column in which the present tally was marked. A pilot model, based on this circuit, was completely fabricated. In order to avoid less reliable D.C. relays, a second and third type of electrical circuit were constructed for a 3 X 3 matrix mock-up model. One consisted of neon lights along the edge of the matrix form which was subsequently discarded because of certain disadvantages. The second consisted of a transistor circuit which provided a more reliable form of D.C. relay circuit.

These efforts occurred early in the history of the project, prior to 1966. This line of development was abandoned for two reasons. First, it was possible to imagine more simple displays of interaction analysis data which did not require matrix tabulation, but which could provide feedback. Second, the potential of remote terminals which could be connected to a computer facility looked like a much more promising approach to the problem.

Remote computer stations:--The project director made arrangements with the Michigan-Ohio Regional Educational Laboratory to sponsor a project which investigated remote coding during the academic year 1967-68, based on ideas which grew out of this project. A report of this project has the following reference: Uldis Smidchens and Rod Roth, "Michigan-Ohio Regional Educational Laboratory's Computerization of Interaction Analysis Project", July, 1968. The report was lithographed by MOREL, 3750 Woodward Ave., Detroit, Michigan. This project was based on a system of multiple coding of single events, making use of the base of a push-button telephone; in turn, this was connected with a tone actuated key-punch at the computing center of the Oakland County Intermediate School District. The major conclusion of this project is that a remote encoding device is possible, but its practical use depends upon the interest of a school faculty in analyzing classroom interaction, the availability of the associated equipment and telephone lines, and the use of the computer for other purposes which would help to justify the installation cost.

The coding factory:--A third approach to this problem was the development of a coding factory during 1968-69, the fourth year of this project. The input to the coding factory was an intelligible sound tape recording of the teacher-pupil communication. Trained observers used push-buttons to code verbal statements as they listened to the recording. These push-buttons were directly connected to a small computer which processed the data and printed out matrix displays as well as several other kinds of displays. All of the interaction analysis data from the fourth year of this project were processed by this method.

Summary:--The third objective of this project was investigated along three separate approaches to the problem. These included a portable matrix tabulator, using a remote terminal connected to a computer, and a coding factory. All three are possible, but each seems to be appropriate to separate applications. The portable coding device is least likely to be fully utilized. The computer based system depends on a substantial investment for equipment and associated telephone lines. The coding factory is most helpful when immediate feedback is not so important.

In terms of this objective, it has been demonstrated that -- (a) a transistor circuit can be used a design a portable matrix tabulator; (b) that remote terminals of computers can be used to code interaction; and (c) that a coding factory can successfully process voice recordings to produce displays of interaction analysis data.

The Objective of Helping Teachers Modify Their Teaching Behavior and Developing Models of Ideal Classroom Interaction.

It is one thing to study classroom interaction in an effort to determine teaching effectiveness, or to identify models of teaching which are based on strategies of instruction, it is quite another thing to help a teacher modify his behavior in terms of one or another model in the hope of becoming more effective. The importance and difficulties of this latter problem are what prompted the inclusion of a fourth year in this project. The plan for this fourth year was conceived in 1963 and the year of inservice training, carried out as part of the project, occurred in 1968-69. During the five to six years between the planning and the chance to carry out the plans, certain changes took place which made a modification of the original plans possible. In this section, there is a discussion of the changes and the reasons for these changes.

The original plan:--The proposal indicates that 15 teachers were to be selected from those who were observed earlier in the sixth, fourth, and second grade samples. Only those who were naturally the most indirect, flexible, and responsive to their pupils were to be selected. They were to be exposed to training experiences which would encourage them to become even more indirect, flexible, and responsive than they already were. In this way, it was expected that we could explore the upper limits of these features of teaching and no doubt witness situations in which too much indirectness tended to reduce teaching effectiveness. In this way, it might be possible to study upper limits of indirectness which usually is not possible in a representative sample of classrooms.

Difficulties with the original plan:--Several problems kept us from carrying out the original plan. First, very few of the Michigan teachers, only two or three, were found to be in the upper limits of indirectness when the comparison was made with other published studies. In any case, many teachers who were the most indirect in our sixth, fourth, and second grade samples were not available for inservice training due to marriage, moving, and promotion.

New emerging priorities:--The attention which has recently been directed to the inner city, to disadvantaged students, and to the need of teachers to relate more effectively to hard-to-reach pupils developed after 1963 and after the project proposal was written. Questions about whether teachers could modify their behavior were again being raised and the evidence at hand appeared inadequate. In the judgment of the staff of this project, it was decided that the more important contribution would be to select some teachers from advantaged and disadvantaged communities and see if a program designed to help them analyze their own classroom communication would result in modifying classroom interaction patterns.

We decided to work with twenty teachers whose school districts represented a broad spectrum of socio-economic differences and then create an intense program of inservice training. One teacher became sick, presumably not due to the training, so that our sample shrank to nineteen.

The inservice training project:--Nineteen teachers of sixth grade, self-contained classes were selected with the requirement that there must be two or more teachers from the same school building. These partners, or trios, were exposed to 17 full days of training during a period which started in mid-December and ended in late February. The inservice program was jointly sponsored with the Michigan-Ohio Regional Educational Laboratory which assisted financially, provided equipment, and gave us program consultant help. We are indebted to Dr. Stuart Rankin, Director of MOREL, for his help and cooperation in making the necessary arrangements.

The purpose of this phase of our four-year project was to explore the notion that teachers would modify their patterns of classroom interaction, with the same pupils, providing they were given an opportunity to conduct personal inquiry projects. These personal inquiry projects were designed to include five steps: (1) decide what target pupil behavior you would like to have in your classroom; (2) with your partner, think of several different patterns of teacher behavior which would support or encourage the desired pupil behavior; (3) practice performing and let the partner practice coding the proposed teacher behavior in microteaching settings; (4) plan to make some kind of comparison or create two (or more) contrasting situations as a design for inquiry; and (5) carry out the action, collect the data, and reach some kind of conclusion as a result of studying the comparison data.

The total research design is explained in detail later on in this report, here it is sufficient to say that as a result of making pre-training and post-training observations on both the experimental and a control group of teachers, it is possible to describe changes in classroom interaction which appear to be due to participating in the inservice training activities.

Identifying models:--Two separate sub-projects were involved with the identification of models of teaching behavior. The first was a Ph.D. thesis, adjunctive to the present project, carried out by Uldis Smidchens (1967) under the supervision of the Project Director. In this study, four interaction models were postulated and described in terms of probabilities of paired, coded events in a 10X10 matrix. A computer program was designed which solved a linear equation for an optimum solution such that the frequencies in a total matrix could be explained in terms of the four models plus an error term. The optimum solution occurred when the error term was at a minimum.

The second approach to developing models was the product of the Project Director's efforts to identify particular interaction patterns which were logically associated with certain skills of teaching. The written report of this second effort was used as instructional material during the inservice training of the nineteen teachers. Reference to both of these efforts can be found in the body of this report.

Summary

This section is devoted to a discussion of the four major objectives of this project in terms of the activities which were carried out. It can be seen that funds were expended and activities were carried out in terms of the four objectives. Some activities were more successful and some less successful. These introductory statements are intended largely to overview the problems encountered in the project, to provide a basis for the reader to judge the quality of the results, and to show the extent to which some progress was made toward each objective.

Chapter Two

THE PROCEDURE AND HISTORY OF EVENTS IN THE SIXTH, FOURTH AND SECOND GRADE LEVELS

Overview

This chapter consists of an outline and description of the procedures used in collecting data at the sixth, fourth, and second grade levels.

The Sixth Grade: 1964-65

The sixth grade level was investigated first because the attitude inventory and the systems of observation which had been used previously in the seventh and eighth grade studies in Minnesota could be used with very little modification.

The Sample

Contact was made with nine school districts and permission was secured to approach 101 sixth grade teachers to ask if they would permit their classes to participate in the study. Teachers who were expecting to supervize student teachers and those participating in team teaching programs were excluded. The geographical location of the selected classrooms concentrated in or near the cities Ann Arbor, Jackson, and Lansing in the State of Michigan.

The Michigan Student Questionnaire.

The Michigan Student Questionnaire was administered in the 101 classes during November, 1964. This sixty item instrument contains items which can best be described in terms of a factor analysis of the student responses. The first and largest factor is called teacher attractiveness and contains such items as -- "I get along well with this teacher." A second factor could be called lack of pupil anxiety since items were negatively keyed; for example, "I worry about getting good grades." Other items loaded on less significant factors. In general, we interpret high class averages as indicating that the students are satisfied with the class and like their teacher. Low scores mean the opposite. The distribution of class averages was reasonably normal and skewed only slightly toward low scores.

The purpose of the first administration of the MSQ was to select 30 classes from the total sample for further participation in the study. The 30 classes were selected by taking the 10 highest, 10 lowest, and 10 classes near the middle of the distribution of class means. The purpose of this selection was to ensure that an adequate range of interaction analysis variables would appear in the 30 classes to be observed later on.

The 30 classes selected and the 71 classes which were not observed had many similarities. For example, the teachers had similar records of professional preparation, in inservice training activities, graduate work in education, sex, and marital status. The teachers in the 30 classes were slightly over represented at the lowest and highest age levels, but these differences were not statistically significant. The median class size was 30 for 30 teachers and 29 for the remaining 71 teachers. The proportion of classes which were grouped on the basis of heterogeneous ability, the opposite of grouping by ability, was 88 percent among the 71 classes and 85 percent among the 30 classes. The sex bias of the MSQ, females score higher, was shown to have no effect on selecting the 30 classes.

The MSQ was administered again in the 30 class sample during January, 1965, and for a third time late in the spring. An article analyzing a general trend of decreasing class averages has been published by Flanders, Morrison, and Brode (1968).

Achievement tests.

The assessment of subject matter achievement within the sample of 30 classes was accomplished by adapting sections of the Metropolitan Achievement Tests (MAT). The entire battery consists of eight major and three minor divisions. Only seven tests were used in this study. These were: Usage, Parts of Speech, Punctuation and Capitalization, Language Study Skills, Social Study Skills, Computation (in mathematics), and Problem Solving and Concepts (in mathematics). All raw scores were converted to standard scores by using the conversion tables supplied by the publisher.

The MAT, as modified, was administered in early November as a pretest and again six months later as a posttest in the 30-class sample. In order to quantify class achievement adjusted for initial ability, a linear regression analysis was made for each subtest. The regression coefficient was calculated from individual scores by the standard procedure. The raw change score, posttest score minus pretest score, was then adjusted by the formula --

$$\overline{Y}_{adj} = \overline{Y}_i - b_w(\overline{X}_i - \overline{X} \quad \text{, where}$$

$$b_w = \frac{\sum_w xy}{\sum_w x^2}$$

In this report, a total achievement score was calculated by combining different subtests of the MAT. The highest adjusted gain was 7.01 and the lowest was -4.85. When classes are divided into thirds on adjusted achievement, the high, middle, and low groups have averages of 5.92, 4.21, and 0.50, respectively.

Correlations between the scores from the first MSQ and adjusted achievement, based on MAT scores, vary from a high of +0.45 for the subtest on Language Study Skills to a low of -0.07 for Punctuation and Capitalization. Total adjusted achievement correlated with initial MSQ at +0.40.

Interaction analysis.

Trained observers were sent to each of the 30 classrooms to code verbal interaction during periods of academic instruction in January, February, and March. The requirement was to obtain more than 6,000 tallies per teacher as a result of four or more visits.

Eleven graduate students and classroom teachers participated in the observer training program during the fall. Training involved voice tape recordings of live classroom communication, instructional filmstrips, and live classroom practice. At the end of training, all observers were checked with a senior staff member, serving as a standard, in at least one live observation. A Scott Reliability Coefficient was determined and all except two trainees exceeded a coefficient of 0.85. The two least reliable observers were assigned to other jobs on the project. Subsequently field reliability checks were made and if reliability was below standard it was usually possible to identify the category or categories involved, to discuss these categories, and then make a second field check to overcome the difficulty. A Chi-square test was also made which showed that the assignment of individual observers to the classes which scored high or low on adjusted achievement and student attitude was unlikely to have biased later class comparisons. For all observations the FIAC system of ten categories was used. A description of these categories can be found in the Appendix of this report.

The Fourth Grade Study: 1965-66.

The fourth grade study occurred in a single school district which is a suburb of the Detroit metropolitan area. Some of the changes, compared to the sixth grade, such as making use of a two-week unit of study, were introduced as a result of the experience of the previous year.

The Sample.

Permission was received from the district administrators to include all of the fourth grade classrooms in the system. However, teachers who expected student teachers, those who were involved in team teaching, or had special problems, were not included in the study. A total of 72 classes were included and nine classes excluded. An attitude inventory was administered to these 72 classes.

Michigan Pupil Attitude Inventory.

The Michigan Pupil Attitude Inventory (MPAI) is a product of analyzing the MSQ. The procedure in modifying the MSQ was to select items which consistently loaded on the first two factors in the original MSQ factor analysis and to eliminate the more difficult words. Next, all directions for the test and the items themselves were recorded on a magnetic tape voice recording. Each administration of the test was accomplished by playing the tape recording so that the entire class proceeded from one item to the next. This lockstep procedure was adopted in order to minimize the effects of individual differences in reading skill. The response scale was keyed so that higher scores represented liking the teacher and being satisfied with the class. The MPAI was administered during late November, 1965.

Sixteen classes were selected for further participation in the study. These classes were the six highest, the six lowest, and four classes near the middle of the distribution of the 72 class averages. Two teachers who were originally chosen from the low scoring group refused to participate. The two classes next higher in the rank order, just above the lowest six, were selected as replacements. The sample of 16 teachers was over represented by single and female teachers, compared with the total of 72 teachers. They were also over represented at the highest and lowest age intervals and under represented in the middle age range. It is unlikely that these differences influenced the comparisons to be made in contrasting classes according to achievement and attitude.

Besides the first administration to all 72 classes, the MPAI was administered in the 16 classes a second time at the end of classroom observation and a third time late in the spring. In the analysis of the data, the second administration scores were used since this assessment was the closest to the observation or an average for all three administrations is used.

The New Zealand Unit of Study.

Two fourth grade teachers, from other school districts, were hired to construct a unit of study on the topic of New Zealand. This subject was chosen because that country is not very well covered in the normal curriculum and information about it is not normally encountered in the daily lives of fourth grade, Michigan children. The unit included a teacher's packet which consisted of materials that could be used in planning and conducting the unit. Teaching objectives were listed, ways to start the unit were suggested, and possible activities such as games, map reading, and worksheets were described. The teacher's packet was given to a teacher about two weeks before the unit was to start in order to allow for planning. Teachers were asked to teach the unit in their usual style.

Just before the unit started, additional copies of the same materials were brought to the classroom so that there were enough for the entire class.

Measuring Achievement.

The New Zealand achievement test was prepared with the help of the two teachers who designed the unit. Instructions for administering the test were tape recorded, as well as the items, which helped to standardize the procedure and helped to minimize differences in reading skills during the test.

The test consisted of (a) twenty true-false statements about New Zealand history, government, economy, and geography, (b) twenty multiple-choice questions covering the same topics, (c) ten items requiring the student to apply principles of economic growth, trade, or land use to a fictitious island. These latter items attempted to assess the students' ability to apply what they had learned to a problem which appeared in a different context.

The achievement test was administered the day before the unit began. Ten teaching days then followed, each daily period lasting no more than 90 minutes. Observers were in the room during the entire ten days. The second administration of the achievement test took place on the day following the completion of teaching and the second administration of the MPAI was included. Six weeks after the completion of the unit the achievement test was administered for the third time. Teachers were not shown copies of the test and were asked to cooperate by not asking their students about the test. A copy of the test can be found in the Appendix.

Achievement was quantified by calculating a percentage gain score as follows: subtract the third administration (six week recall) from the first administration and multiply by 100; divide by the total possible score on the test minus the pretest score. The ratio, in this equation, is the actual gain, in the numerator, divided by what could have been gained, in the denominator. The highest mean gain score for a class was 36.2 and 4.1 was the lowest. A second analysis, making use of standard linear regression in which final scores were adjusted by pretest scores, failed to produce a rank order of classes which was different than the order from the first analysis.

There are interesting relationships between adjusted achievement and pupil attitude scores which came from the first administration. The correlation between class means for these two variables is +0.57 which is fairly high. On the other hand, when the correlation is based on individual student scores and not class means, the coefficient is +0.24 which is quite a bit lower. Both correlations are greater than would be expected by chance. Perhaps the conservative explanation is that the higher correlation reflects the effects of teaching behavior while the lower correlation reflects the idiosyncracies of the individual students.

Interaction Analysis.

A twenty-two category system was developed for coding classroom verbal interaction during the ten teaching days. The system is based on subscripting the ten categories of the FIAC system and therefore has the advantage of being able to collapse the data into the basic ten category format. A description of the category system can be found in the Appendix.

Twenty-six prospective observers joined the observer training sessions. The training activities again included work with tape recordings, group discussion, and live observation practice. The five most reliable observers were selected to code verbal interaction for the project. The Scott Reliability Coefficients were somewhat lower, given the more complicated system. During the collection of data, spot checks of reliability were made. The mean coefficient for ten categories was +0.81 and for the 22 categories was +0.77.

The Second Grade Study: 1966-67

The second grade study faced the difficulty that the reading skills of younger children were too variable and the average too low to make use of a student attitude inventory as part of the procedures for selecting a small sample of teachers.

The Sample.

Fifteen teachers of self-contained, second grade classroom were selected for the study. The three nearest school districts were contacted, meetings were arranged in order to describe the project and solicit volunteers. Those finally selected had a median of four years teaching experience, the range was from one to 23 years. There was a spectrum of socio-economic differences among the communities in which the schools were located. One classroom was in an extremely deprived neighborhood, three had a balance of both lower middle class and upper lower class, seven were predominantly middle class, and four were upper middle class. These classifications were made by members of the research staff who did the observations. The teachers were recruited during September and October, 1966, and are most simply and accurately described as volunteers.

Student attitudes.

Even though it was considered improbable that the research staff could design an attitude inventory in time to select teachers, one more enterprizing member of the research staff attempted to design such an instrument. His efforts succeeded to the point that in the middle of the academic year, he did administer two tests, one of which had six items which were identical with MPAI items on teacher attractiveness. Second grade students reacted to these items by marking a large "yes" or "no" after practice instruction and in response to items which were read by an adult. The class average on these six items are reported in this study as a measure of positive pupil attitudes.

Measuring Achievement.

Achievement was measured with the Stanford Achievement Test, Primary Battery, I. The criteria used to select the test were; first, the relevance of the material tested; second, the reliabilities reported in the Buros Yearbook; third, the administration time required for the various subtests; and fourth, the ease of administration. Three subtests were used, and each was altered -- either in time required for administration, or in number of items. The Paragraph Meaning subtest was reduced to 12 minutes for the 38 items. Only the first three sections of the Word Study Skills subtests were used, the fourth being omitted. The 18 items of the Arithmetic Problem Solving subtest which dealt with story problems were used, while those requiring the identification of numbers and other very basic arithmetic operations were deleted.

The administration of the achievement test took approximately one hour, including the time spent passing out booklets and pencils, and taking a break in the middle of the test. A trained test administrator read the instructions to the class for each subtest. In the case of the Word Study Skills subtest and the Arithmetic Problem Solving subtest, the tester also read the individual items to the class. The Paragraph Meaning subtest did not require the tester to read the items.

The pretest was administered during the first week of November, 1966. The posttest was given during the second week of March, 1967.

Interaction Analysis.

Observer training began in September, 1966 with six potential observers. Eleven meetings were held, and seven in-training reliability checks were made during the meetings. There were thirty hours of observer training.

During the first five meetings the observers concentrated on the basic ten categories. The last six meetings were spent learning the subcategories. The results of field reliability checks were satisfactory with the median reliability for the ten categories .87 and for the twenty-two categories .76. A copy of the second-grade twenty-two category system is included in the Appendix.

The classes were observed beginning in the middle of October and ending in the last week of January. The general pattern of observation for an individual class was three morning sessions and two afternoon sessions on different days over a two or two and one-half week period. In almost all of the classes the morning was devoted to reading and language arts activities, while arithmetic, science, and social studies took place in the afternoons. The observations were scheduled so that there would be data for each type of classroom subject matter.

At the beginning of the observation period the observer was directed to watch the class without coding for one-half hour, in order to get used to the atmosphere and to become adjusted to the peculiarities of the individual teacher and class. Following this "warm-up" period, the observer coded the verbal interaction in the classroom. In addition, he recorded the purpose, activity, and formation of the class. As a matter of procedure, the teachers had been asked to introduce the observer to the class, simply explaining that he would be with them for several days. The observers had been instructed not to initiate contacts with the children.

Summary

The purposes of selecting teachers for observation were first, to locate specimens of classroom interaction which would permit us to form the contrasts necessary to test our hypotheses, and second, to combine our data in an effort to describe normative interaction patterns. Our procedures were designed to subordinate the second purpose to the first. When forced to choose, we would prefer to describe relationships between interaction and educational outcomes rather than assert that our data represent an accurate picture of common instructional practices at a particular grade level.

Chapter Three

THE RESULTS: ASSOCIATIONS BETWEEN INTERACTION ANALYSIS VARIABLES AND STUDENT ATTITUDES OR ACHIEVEMENT AT EACH GRADE LEVEL

Introduction

This chapter contains the results for each grade level, discussed one at a time. In Chapter Four, a regression analysis of the data from all three grade levels plus the seventh and eighth grade samples from an earlier Minnesota study is presented. Significant relationships are found to exist between various measures of classroom interaction and average class scores on the attitude and achievement tests which support two of the four hypotheses of this study.

The Four Hypotheses

The four hypotheses to be considered in analyzing data from the sixth, fourth, and second grades are the following: Given a group of classes in which the attitudes and content achievement of the students are above average, compared with another group of classes in which these measures are below average, comparisons between the groups will show that in the above average classrooms:

Hypothesis A:--more indirect teacher influence will occur when new material is being introduced and when the diagnosis of difficulties occurs;

Hypothesis B:--more direct teacher influence will occur at the later stages of classroom learning cycles after new material has been introduced;

Hypothesis C:--more flexible patterns of teacher behavior will occur across different subject matter lessons and over different phases of classroom learning;

Hypothesis D:--during all phases of classroom instruction there will be a higher proportion of indirect influence.

Definition of Terms Used in the Hypotheses

By content achievement is meant the amount of subject matter learning which takes place over a period of time, adjusted for initial ability, and averaged for the entire class. This is quantified by using standardized tests in the sixth and second grade levels and a special test on New Zealand in the fourth grade, as described in the previous chapter. The adjustment for initial ability is accomplished by using an analysis of covariance to adjust the final test scores. An exploration of percentage gain scores was made with the fourth grade achievement scores. An exploration of matched pairs of classes was made with the second grade achievement scores.

By student attitudes is meant liking the teacher, liking the classroom learning activities, and the absence of fearful anxiety about learning and the teacher. This assessment is made by administering an attitude inventory after at least one month of class activities during a given school year. When the inventory was administered on more than one occasion during the school year, the administration which occurred nearest the class observations was used.

By indirect teacher influence is meant teacher statements which tend to expand the freedom of action of students by increasing their participation. Examples are asking questions, clarifying and using ideas suggested by students, and giving praise and encouragement to students. This is quantified by systematic interaction analysis using the FIAC system. In the case of the fourth and second grades, subscripts of the standard categories provided some finer distinctions. Use of these distinctions in this report is restricted to the fourth grade.

By direct teacher influence is meant teacher statements which tend to restrict the freedom of action of students by curtailing their participation. Examples are lecturing, giving directions, and giving criticism. This is quantified by systematic analysis using the FIAC system.

By new material is meant ideas or topics which are interjected into the learning activities by discussion, assignment, or starting a new unit of study with the expectation that the students will study them. The judgment concerning new versus old is made by the observer and his notations isolate periods of classroom interaction according to this criterion.

By diagnosing difficulties is meant those contacts between a teacher and a student which have the purpose of helping the student overcome some difficulty during learning activities. Since it was most difficult to collect data under these circumstances and when possible the incidence was so low, no analysis of this activity appears in this report.

By later stages of learning cycles is meant the application, work, or evaluation periods of classroom activities which occur after individual tasks are clear, after new material has been introduced, and the students are busy doing schoolwork.

By flexibility of teacher influence is meant variation in the patterns of direct and indirect teacher influence between the different subjects which are taught in a self-contained classroom and from one phase of learning to another within a particular subject. This variable is quantified by calculating the variance of the i/d or i/i + d ratios, each ratio based on a single segment of interaction, and it is also quantified by a new ratio. This latter measure makes use of the frequencies in those transition cells that are involved when a teacher shifts from direct to indirect influence patterns and indirect to direct. In this case the cell frequencies are taken from the composite matrix of a teacher.

Kinds of Generalizations Expected

As mentioned earlier, two kinds of generalizations are expected in this project. The first type can be called normative generalizations and will refer to summary descriptions of interaction at each grade level. The second type are statements which support or reject the associations proposed in each hypothesis. In general, each hypothesis states an association between an interaction analysis variable and some learning outcome such as pupil attitude and pupil achievement adjusted for initial ability.

Normative generalizations:--Statements of this type are descriptive and are based on some kind of display of interaction analysis data. In the sixth and fourth grade the logic of an inference is based on sampling theory. An attitude inventory was first administered to a target population and the class averages formed a frequency distribution for the entire population. Classes were selected for observation from the top, middle, and bottom of this distribution. A generalization involving interaction analysis data could then be made from a composite of all coded data from the classes observed or for some subgroup of the classes observed. For example, we might wish to make a generalization about the incidence of using questions for all classes which we observed in the sixth grade, but we would use a subgroup to make the same generalization about sixth grade classes in which pupil attitudes are above average. Another type of generalization might involve the teaching of a particular subject in a self-contained classroom. For example, a generalization about how often pupil statements show initiative while arithmetic is being taught would be based on all periods of observation which occurred during arithmetic lessons and the elapsed time of such observations would vary, one teacher compared with another.

Sampling procedures create logical linkages between the classes which were chosen for observation and the target populations. All of these linkages are probability generalizations and involve some degree of error. Thus, a generalization based on the classes observed is an estimate or approximation of the parent population. In our studies, estimates of central tendency are probably more accurate than variation between classes since the classes observed formed a symmetrical sample of the parent population. However, the estimates of variation between classes may be too high because classes with extreme scores on attitude are over represented and average classes are under represented.

In the case of the second grade, no parent population was designated and subsequently sampled. Normative generalizations refer only to the classes observed which, in turn, can only be described according to the procedures used for their selection.

At first glance, one would think that the logical linkages, mentioned above, would provide a basis for extending any normative generalizations from this study to all classes at the same grade level, especially in the sixth and fourth grades. However, these probability relationships establish linkages only between the parent sample of classes and the classes which were observed. With small observed samples, like 30 in the sixth grade and 16 in the fourth grade, the probable representativeness of the observed sample could be fairly low even with the advantage of selecting classes according to their average attitude scores. In addition, the larger population samples are essentially inconsequential and not necessarily related to any other groups. For example, why should classes in Michigan and Minnesota be similar to classes on the West Coast or East Coast? On the other hand, why shouldn't they be similar? In this project there has been no systematic sampling of a national population, none was promised, and none carried out. This is an inescapable restriction to any normative generalizations.

Generalizations about the four hypotheses:--In the case of the sixth and fourth grades, fairly straightforward applications of t-tests and F-tests are used to determine whether the data support or fail to support each of the hypotheses. These tests are fairly robust and are less likely to produce false conclusions due to skewed distributions. It is the purpose of this section to show some of the typical distributions which various variables form, to comment on the skewness, and to consider the effects of selecting classes from the extremes of the attitude distribution in order to investigate relationships between two other variables such as adjusted achievement and an interaction analysis variable.

The procedure used in the sixth grade was to select ten classes from the top, bottom, and middle of a distribution of 101 class averages based on the first administration of a pupil attitude test. The distribution for the 101 class averages was fairly normal and is sketched as a theoretical curve in Figure 3-1. The average attitude scores for the ten classes in each of the three groups are also shown in histogram form. Note that the classes selected to be observed symmetrically sample the target population. If the top and bottom groups only had been selected, the sample to be observed would present a clear, discontinuous bimodel distribution.

The distribution of the average, class achievement scores, adjusted for initial ability, is shown in Figure 3-2 for the 30 classes observed. Note first that the distribution is negatively skewed. However, the separate distributions for each group of ten classes also tends to be the same as the distribution for 20 classes. Finally, note that if the top and bottom groups only had been observed, there would be considerable overlap, there would not be a discontinuous, bimodal distribution, and the combined distribution for the 20 classes would retain the same negative skewness.

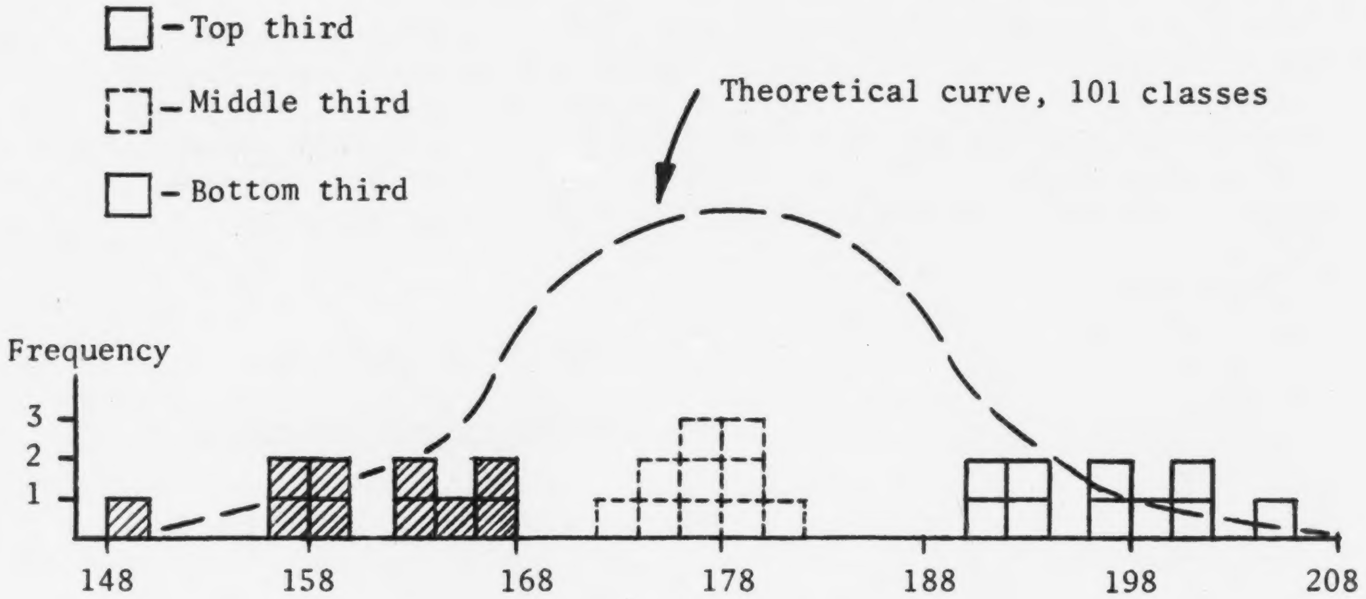


Figure 3-1.--Selecting Classes with Pupil Attitude Means.

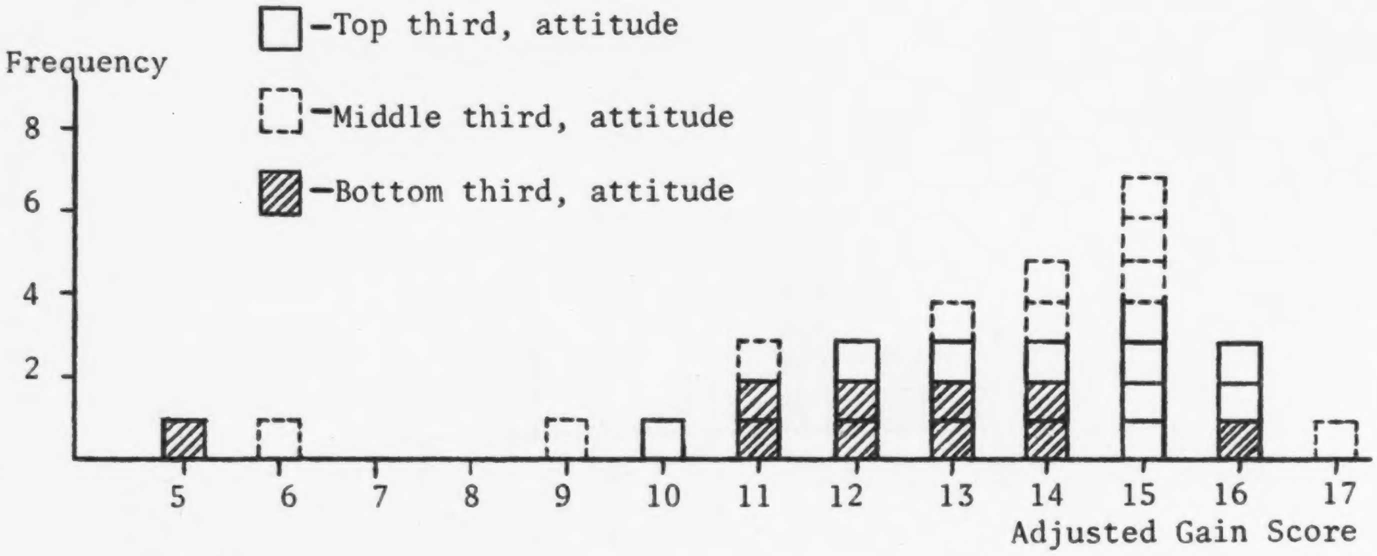


Figure 3-2.--Average Class Achievement, Sixth Grade.

Indirectness is an interaction analysis variable which can be quantified in several ways including the i/d ratio or the i/i + d ratio. The distributions for both ways of quantifying this variable are shown in Figures 3-3 and 3-4. The i/d ratio in Figure 3-3 is positively skewed to a high degree, approaching the expected "J" shaped curve. The i/i + d ratio in Figure 3-4 may be positively skewed, but this is barely perceptible with the small samples involved. In both Figures 3-3 and 3-4 there is an overlap between all groups including the top and bottom group.

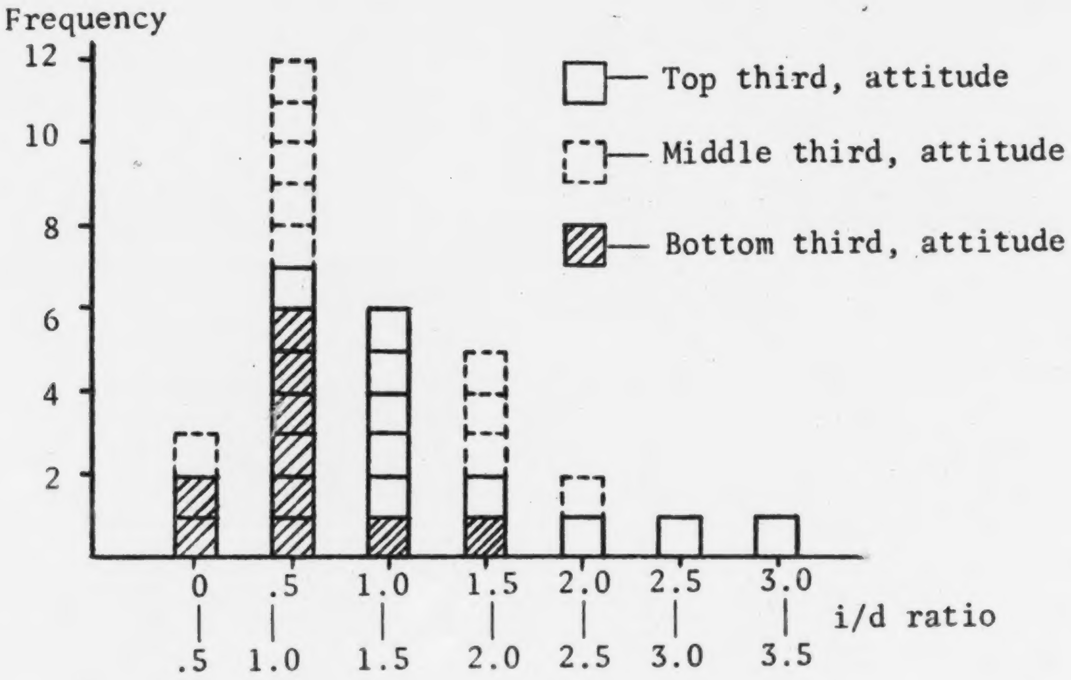


Figure 3-3.--Indirectness, Sixth Grade.

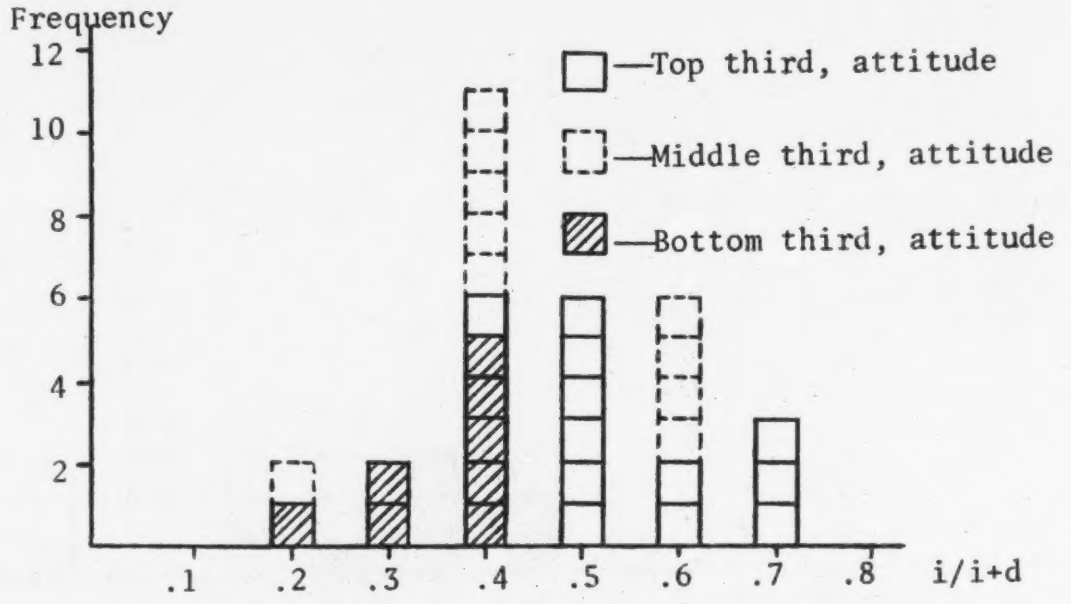


Figure 3-4.--Indirectness, Sixth Grade

One inference from an inspection of these distributions is that it would be wise to test for homogeneity of variance before applying a t-test or an F-test. Another inference really applies to the multiple correlation analysis which will be presented in Chapter Four. Zero order correlations between two variables such as indirectness and adjusted class average achievement may be underestimated with some distributions. In any case, significant differences in Chapter Three should be demonstrated by the use of the more robust t-test and F-test before risking inferences from a multiple correlation analysis.

We turn now to the results in each of the three grades. The only data to be found in this chapter are essential to some statistical analyses. Additional data can be found in the various appendices.

The Results from the Sixth Grade

Table 3-1 shows the means and standard deviations of the attitude inventory which was administered three times to the thirty classes which were observed. The data are arranged on the basis of the top, middle, and bottom ten classes according to the first administration. Table 3-2 lists the i/d ratios and total tallies for each of the thirty classes. Table 3-3 shows the average adjusted achievement scores based on the regression analysis described in the previous chapter.

The four hypotheses which are listed in the original proposal of this project are discussed and evaluated in the reverse order.

Indirectness in All Phases of Classroom Instruction

Hypothesis D states that there will be a higher proportion of indirect influence during all phases of instruction in those classes which score high on positive pupil attitudes and achievement adjusted for initial ability.

Simple t-tests:--One test of this hypothesis can be arranged by placing the 30 classes in a rank order from highest to lowest i/d ratio, based on all observations. By splitting the sample at the median, the 15 classes which are higher on indirectness and the 15 which are lower can be identified. The results of three such tests are shown in Table 3-4. The data in Table 3-4 support the hypotheses in which teacher indirectness is associated with more positive pupil attitudes and high achievement adjusted for initial ability.

Analysis of covariance with three groups:--As explained in the previous chapter, the procedure used to select 30 classes for observation from the 101 in the original sample can be considered to be a case of stratified sampling. The top ten classes, the bottom ten, and ten in the middle of the distribution of the first attitude inventory can be kept intact during the analysis of the data as a second test of Hypothesis D.

TABLE 3-1

MEANS AND STANDARD DEVIATIONS OF THE MICHIGAN STUDENT QUESTIONNAIRE

Teacher Number	First Administration			Second Administration			Third Administration		
	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
54	204.92	19.52	25	194.67	29.65	24	194.17	25.93	23
50	201.43	12.02	30	199.97	16.06	29	195.40	15.83	30
89	200.25	24.58	24	204.91	19.53	22	200.04	19.10	24
80	199.62	16.22	29	194.71	24.18	31	192.33	23.49	30
28	197.52	13.93	31	195.22	19.00	32	195.19	21.31	32
30	197.00	17.92	29	193.52	20.75	29	189.90	24.15	30
24	193.64	19.39	28	190.55	24.01	29	187.90	26.26	29
27	192.04	25.94	25	185.71	26.24	28	175.93	27.25	27
13	191.57	24.43	23	178.92	31.08	26	186.54	20.63	26
08	190.28	19.71	25	178.29	22.41	28	176.34	29.18	29
12	180.88	16.34	24	163.71	26.83	24	156.32	29.92	25
53	179.17	17.17	23	180.33	25.87	24	176.21	24.66	24
15	176.84	14.03	25	173.34	17.44	29	164.52	18.94	27
00	176.84	17.21	31	171.35	26.62	26	155.73	20.80	30
95	175.23	14.99	30	151.87	25.47	31	155.72	19.09	32
37	178.77	27.71	31	178.00	36.58	31	176.06	33.41	32
64	177.86	24.18	28	185.38	25.34	29	178.21	22.40	28
26	176.19	26.04	27	166.61	32.57	28	169.28	39.30	29
40	175.39	27.08	28	169.61	21.07	29	167.03	23.57	31
42	173.83	29.76	36	170.21	28.72	33	166.49	26.63	35
72	166.40	14.23	25	173.05	23.43	20	174.95	18.46	19
75	166.15	32.49	20	147.65	30.61	20	150.37	27.38	19
19	165.10	24.15	29	151.30	28.35	30	143.83	26.60	29
77	162.74	28.94	31	174.69	31.29	26	173.93	26.24	29
99	162.71	19.67	31	159.79	24.26	29	160.77	21.67	26
84	158.13	24.72	31	149.43	28.72	30	147.20	25.30	25
48	158.06	19.06	31	153.97	23.08	30	161.16	24.28	32
51	157.15	26.79	27	145.50	25.88	24	139.23	33.89	26
73	156.57	20.74	21	137.33	16.27	24	147.70	21.88	20
34	149.91	20.67	22	137.17	21.68	24	142.23	28.30	22

TABLE 3-2

TOTAL i/d RATIO AND TOTAL TALLIES FOR 30 CLASSES

Class Number	Total i/d	Total Tallies	Class Number	Total i/d	Total Tallies
89	3.18	6802	42	0.94	6117
50	2.97	7200	95	0.92	6317
64	2.31	6514	48	0.90	7076
40	2.17	7183	37	0.88	6324
27	1.98	6517	53	0.87	7417
28	1.92	8273	84	0.81	6528
26	1.83	6299	12	0.80	6241
00	1.73	5994	80	0.75	9017
15	1.61	7066	19	0.75	6833
30	1.47	7853	34	0.73	6317
24	1.25	8021	77	0.69	7690
51	1.23	8815	73	0.62	6003
08	1.20	8361	91	0.45	5705
54	1.27	7868	72	0.33	6799
13	1.02	5765	75	0.29	6833

TABLE 3-3

TOTAL AVERAGE ADJUSTED GAIN MEAN FOR 30 CLASSES

Class Number	Rank	$\bar{Y}_{adj}$	Class Number	Rank	$\bar{Y}_{adj}$
15	1	7.01	19	16	4.02
13	2	6.83	26	17	3.96
12	3	6.81	28	18	3.81
08	4	6.33	51	19	3.56
37	5	5.92	00	20	3.18
30	6	5.46	91	21	2.94
89	7	5.31	80	22	2.73
24	8	5.25	34	23	2.41
48	9	5.22	75	24	1.69
50	10	5.08	95	25	1.64
40	11	5.05	42	26	1.60
64	12	4.99	54	27	0.68
27	13	4.92	53	28	-0.58
84	14	4.40	72	29	-3.26
77	15	4.22	73	30	-4.85

TABLE 3-4

TESTS BETWEEN GROUPS ABOVE AND BELOW THE MEDIAN ON INDIRECTNESS

Variable	Higher Mean	Lower Mean	"t"	"p" One-tail
2nd Attitude	182.21	161.55	3.518	< .01
3rd Attitude	178.39	161.69	2.907	< .01
Adjusted Achievement	14.76	12.33	2.402	< .02

This analysis begins with the three groups of ten classes each, taken from the top, middle, and bottom of the first administration of the pupil attitude inventory. There are three variables: first, the i/d ratio representing indirectness of teacher talk; second, the second administration of the pupil attitude inventory; the third, average class achievement adjusted for initial ability. In a series of separate regression analyses, any one of the last three variables can be the dependent variable, while a second--and even a third, can be used as covariants. Six separate analyses of variance and covariance can be found in the appendices for the sixth grade. A summary of these analyses now follows.

(1) Are there differences between the three groups in terms of teacher indirectness, adjusted achievement, and second attitude inventory? The F tests from a simple analysis of variance between groups are --

(a) Second attitude, F = 31.512, p = 0.0000

(b) Teacher indirectness, F = 7.563, p = 0.0025

(c) Achievement gain, F = 2.615, p = 0.0916

An inspection of the group means indicates that all associations among the four variables are positive or direct (e.g., first attitude, second attitude, indirectness, and achievement).

(2) When the three groups based on first attitude are ignored and the 30 classes considered together, is the association between any two variables greater than would be expected by chance? The F tests for each pair are --

(a) Indirectness and 2nd attitude, F = 7.310, p = 0.0039

(b) Indirectness and achievement, F = 4.916, p = 0.0212

(c) Achievement and 2nd attitude, F = 1.344, p = 0.2448

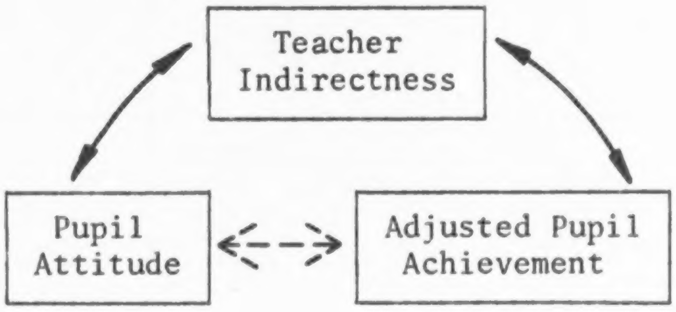
Several inferences can now be made. First, the first attitude and second attitude variables are essentially the same (see 1-a, above) which is not surprising since the identical test was administered to the same pupils on two different occasions. Second, teacher indirectness is positively related to measures of pupil attitude (see 1-a and 2-a). Third, teacher indirectness is positively related to achievement adjusted for initial ability all classes considered (see 2-b), but less so between the groups selected on the basis of initial attitude (see 1-c). Fourth, achievement and attitude are not strongly related when the total sample is considered (see 2-c) or between the groups (see 1-c).

(3) When one variable is used to make a covariant adjustment to another, are there modifications to the inferences which were just mentioned (above)? To answer this question, pairs of variables were compared by reversing their position in a covariance analysis. Use the following sentence to interpret the data below--"What is the probability that the differences between the three basic groups on variable A are due to chance, when variable A is adjusted by covarying on variable B?"

Pair	Dependent Variable A	Covariant Variable B	F-ratio	Probability
a	Indirectness	2nd Attitude	2.199	0.1312
	2nd Attitude	Indirectness	19.479	0.0000
b	Achievement	2nd Attitude	2.223	0.1284
	2nd Attitude	Achievement	29.521	0.0000
c	Achievement	Indirectness	0.593	0.5600
	Indirectness	Achievement	4.767	0.0172

The first two pairs, a and b, provide us with no new information. We would expect these results with three groups which were selected on the basis of the first attitude variable. The third pair shows that when the common variance between indirectness and achievement is suppressed first from one source and then from the other, there are differences in the outcome. For example, when teacher indirectness provides the covariant adjustment, the differences between the three groups in achievement disappear. On the other hand, when achievement is the covariant, the differences in indirectness are reduced, but are still "statistically significant". These results are consistent with the analyses reported earlier. The variable of teacher indirectness has a kind of robustness about it which is illustrated by the analyses of 2-a, 2-b, and 2-c and by the contrast of pair 3-c.

In the diagram to the right, the associations between teacher indirectness and the two lower variables are stronger than the association between attitude and achievement.



By way of summary, this second "three group" analysis of the data has contributed information, but the design fails to create a direct test of the hypotheses. The three groups of ten classes each were selected so as to be representative of the parent population of 101 classes in terms of initial pupil attitude. This selection process tends to insure variety among the 30 classes which were observed, but this three-group arrangement provides no special advantages for testing our hypotheses.

The cleanest test of the hypotheses would be to form two contrasting groups of the classes each: first for high and low achievement; and second, for high and low second pupil attitude, then analyze the differences in teacher indirectness between the two groups. This procedure is followed in the next section.

Both attitude and achievement contrasts:--Thus far our analysis has contrasted groups on the basis of either attitude scores or achievement scores. In this section ten classes which are above the median in both adjusted achievement and positive pupil attitudes are contrasted with ten classes which are below the median on both measures.

The classes selected for this comparison are listed in Table 3-5. The i/d ratios which will be compared in this section are shown on the left. The standard deviation of each teacher's i/d ratio is shown to the right. These latter scores will be analyzed in the next section which is concerned with flexibility of teacher influence.

TABLE 3-5

TEACHER INDIRECTNESS FOR CLASSES THAT ARE HIGH AND LOW ON ATTITUDE AND ACHIEVEMENT

High Attitude and Achievement Classes			Low Attitude and Achievement Classes		
Teacher Number	i/d Ratio	Standard Deviation i/d	Teacher Number	i/d Ratio	Standard Deviation i/d
89	3.18	1.68	26	1.83	1.08
13	1.02	2.18	91	0.45	0.27
50	2.97	1.68	00	1.73	0.80
30	1.47	1.27	42	0.94	0.29
08	1.20	1.03	19	0.75	0.40
24	1.25	2.04	51	1.23	0.51
37	0.88	0.31	95	0.92	1.08
64	2.35	0.14	75	0.29	0.39
27	1.98	0.98	34	0.75	1.23
77	0.69	0.21	73	0.62	0.65
Mean	1.6990	1.3520		0.9490	0.6700
s^2	0.6964	0.4633		0.2345	0.1148

For classes high in both attitude and achievement the mean is 1.6990 and the mean for those classes low on both attitude and achievement is 0.9490. This means that in the high group, teachers made more indirect statements than direct. In the low classes, the reverse is true, but just barely. A better description of the low classes is that the teacher made approximately as many indirect as direct statements.

The *t*-test for difference in i/d ratio means yielded a *t* of 2.3328 (P = 0.025), a variance of 0.6964 for the high attitude and achievement group, and a variance of 0.2345 for the low attitude and achievement group. The difference between the variances raised some doubt as to whether $\sigma_1^2 = \sigma_2^2$. Therefore, a test of the equality between two variances was applied. The test criterion is $F = s_1^2/s_2^2$, where s_1^2 is the larger mean square.[1] So $F = 0.6964/0.2345 = 2.97$. Since $F_{95}(9.9) = 3.18$ (one-tailed test), the null hypothesis that s_1^2 and s_2^2 are independent random samples from normal populations with the same variance σ^2 is accepted. Therefore, the *t*-test for difference in means is an appropriate test to use.

Summary of Hypothesis D:--All of the tests of Hypothesis D provide support for the notion that teacher indirectness is higher in classrooms that score above average on positive pupil attitude inventories and on tests of achievement adjusted for initial ability. There will be further evidence in support of Hypothesis D presented in the next chapter.

Flexibility of Interaction and Educational Outcomes

Hypothesis C states that as different subjects are taught in the self-contained classroom and as the learning activities move from one phase of learning to another there will be greater variation in teacher interaction patterns in those classrooms which are above average on scores in achievement and attitude compared with below average classes.

One way to quantify teacher flexibility is to use the standard deviation of the i/d ratio. A list of such ratios for the ten classes which were above and below the median in *both* achievement *and* attitude is shown in Table 3-5. The basic data for calculating such a statistic is summarized in Table 3-6 for all 30 classes. A distinction should be made between the variance of the 30 i/d ratios and the variance of i/d ratios from a single classroom. Thus, one cannot test this hypothesis as a by-product of analyzing the i/d ratios, instead an average of individual teacher ratios is required. It is this average for the classrooms to be compared which can be found in Table 3-5, listed to the right.

The t-test for the difference between means can be applied to the data from Table 3-5. However, the $s_1^2/s_2^2 (0.4633/0.1148) = 3.18$, and $F_{.95} (9.9) = 3.18$, so it is not reasonable to assume that the two distributions of i/d ratio variance are independent random samples from the same population. Snedecor and Cochran (1967, p. 115) suggest that the t-test be used

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[1] George W. Snedecor and William G. Cochran, 1967 *Statistical Methods*, Ames, Iowa: The Iowa State University Press, p. 117.

TABLE 3-6

SUBJECT-MATTER AND TIME-USE i/d RATIOS FOR 30 TEACHERS

Class Number	Total i/d	AR*	LA*	SS*	M*	S*	P*	NM*	E*	R*	OM*	S.D. of i/d Ratios
89	3.18	--	1.59	4.96	0.68	2.67	--	2.28	--	--	4.61	1.68
50	2.97	2.46	2.63	2.26	3.86	4.90	4.44	3.44	6.36	0.92	1.88	1.68
64	2.31	1.52	2.14	3.81	1.51	8.10	1.61	3.11	1.85	--	1.67	2.14
40	2.17	0.33	1.74	5.06	1.28	3.31	0.33	2.24	1.90	--	2.91	1.50
27	1.98	0.06	2.02	1.91	2.72	2.68	0.64	2.23	--	1.07	2.76	0.98
28	1.92	0.21**	1.51	2.44	1.90	4.29	0.21	2.00	--	3.09	1.94	1.29
26	1.83	--	1.67	3.47	0.89	2.77	--	1.60	3.30	--	3.60	1.08
00	1.73	0.63**	1.29	2.45	1.40	2.42	--	1.88	0.44	2.71	1.61	0.80
15	1.61	2.61	0.94	4.21	1.09	0.96	2.55	1.54	--	16.00	1.21	4.83
30	1.47	2.05	1.06	5.13	1.42	1.94	1.36	1.59	1.39	0.34	1.63	1.27
24	1.25	1.02	1.60	0.78	1.26	0.41	1.02	1.12	7.11**	--	1.51	2.04
51	1.23	0.63	1.09	1.63	1.00	2.18	0.63	1.36	0.95	--	1.58	0.51
08	1.20	1.61	0.84	1.81	0.59	1.89	0.95	1.24	3.86	--	1.29	1.03
54	1.27	2.63	0.96	2.32	0.32	--	1.69	0.96	--	--	0.57	0.88
13	1.02	7.67	2.03	0.95	1.67	0.62	0.77	0.88	2.17	--	1.75	2.18
42	0.94	1.18	0.69	1.60	0.85	--	1.08	0.64	1.13	1.08	1.12	0.29
95	0.92	0.23**	0.50	1.95	0.74	1.89	1.07	1.47	3.74	--	0.60	1.08
48	0.90	0.08**	1.23	0.42	0.89	--	0.39	0.77	2.50	0.35	1.08	0.72
37	0.88	--	0.82	1.27	0.72	--	--	0.69	0.86	1.09	1.52	0.31
53	0.87	0.24	0.31	1.15	1.06	2.29	0.24	0.99	1.00	0.96	0.47	0.62
84	0.81	--	0.80	1.12	0.66	1.09	--	0.89	--	--	0.75	0.19
12	0.80	0.87	0.73	1.19	0.76	2.03	0.29	0.73	0.76	2.03	1.19	0.57
80	0.75	0.44	0.75	1.23	0.57	0.08	0.27	0.59	1.03	--	0.74	0.36
19	0.75	0.50	0.44	1.28	0.54	1.22	0.50	1.08	--	0.10	0.71	0.40
34	0.73	0.29	0.66	0.93	2.40	--	0.27	1.30	4.02	0.50	0.88	1.23
77	0.69	--	0.98	0.48	0.65	1.10	--	0.76	0.76	--	0.61	0.21
73	0.62	--	0.59	0.31	1.30	--	--	0.44	2.03	--	1.00	0.65
91	0.45	0.03	0.54	0.73	0.49	0.41	0.04	0.57	0.04	--	0.59	0.27
72	0.33	0.06**	0.30	0.38	0.32	1.52**	0.06	0.33	0.13	--	0.52	0.45
75	0.29	--	0.32	0.24	0.38	0.51	0.05	0.33	1.42	0.26	0.30	0.39

*AR = Administrative Routine LA = Language Arts SS = Social Science M = Math S = Science
P = Planning NM = New Material E = Evaluation R = Reading OM = Old Material

** Based on fewer than 100 tallies

under these circumstances. When $n_1 = n_2$, the t is calculated in the usual way, but the difference between the t and the procedure is accomplished by changing the degrees of freedom; instead of 2(n-1) the df used is simply (n - 1). A comparison of 1.3520 and 0.6700 with this test yields a t of 2.6924 which is significant beyond the 0.025 level of confidence when a one-tailed test is used (e.g., $t_{.025}$(9 df) = 2.262). This result supports Hypothesis C since the difference between the means is in the right direction and large enough so that it could be expected to occur by chance in less than 2 1/2 percent of similar samples.

A similar test was made for the ten highest and ten lowest classes in pupil attitude scores alone and then achievement alone. The data for these tests are shown in Tables 3-7 and 3-8. In the case of pupil attitudes t = 3.8950 which can be compared to $t_{.005}$(9 df) = 3.250. For achievement, t = 2.3989 which can be compared to $t_{.025}$(9 df) = 2.262. These results all support the notion that flexibility of teacher influence is associated with those classrooms in which measures of desired educational outcomes are higher. In the next chapter, further evidence about flexibility is discussed using a different method of quantifying flexibility.

TABLE 3-7

FLEXIBILITY (STANDARD DEVIATIONS OF i/d RATIOS) OF HIGH ATTITUDE CLASSES AND LOW ATTITUDE CLASSES

High Attitude Classes		Low Attitude Classes	
Teacher Number	S.D. of i/d Ratios	Teacher Number	S.D. of i/d Ratios
89	1.68	91	0.27
50	1.68	12	0.57
28	1.29	00	0.80
54	0.88	95	1.08
80	0.36	75	0.39
30	1.27	73	0.65
24	2.04	84	0.19
13	2.18	19	0.40
64	2.14	34	1.23
08	1.03	51	0.51
Mean = 1.4550	s_1^2 = 0.3210	Mean = 0.6090	s_2^2 = 0.1039

Summary of flexibility:--Although Hypothesis C appears to be supported in the sixth grade sample, it would be wise to point out how primitive this hypothetical relationship is. Whenever this hypothesis is supported, it means that some kind of variation is more likely to be present in those classrooms which have higher scores on desired educational outcomes. Nothing, however, can be said from this kind of analysis about what kind of variation does exist.

TABLE 3-8

FLEXIBILITY (STANDARD DEVIATIONS OF i/d RATIOS) OF HIGH ACHIEVEMENT AND LOW ACHIEVEMENT CLASSES

High Achievement Classes		Low Achievement Classes	
Teacher Number	S.D. of i/d Ratios	Teacher Number	S.D. of i/d Ratios
15	4.83	91	0.27
13	2.18	80	0.36
12	0.57	34	1.23
08	1.03	75	0.39
37	0.31	95	1.08
30	1.27	42	0.29
89	1.68	54	0.88
24	2.04	53	0.62
48	0.72	72	0.45
50	1.68	73	0.65
Mean = 1.6310	s_1^2 = 1.4899	Mean = 0.6220	s_2^2 = 0.1033

In this research design, we can only say that there was more variation. Some suggestions about the direction of variation can be found in Flanders (1970, p. 327).

Changes of Indirectness with Changing Purpose and Materials

Hypotheses B and A cannot be easily tested under the field conditions which were present during the sixth grade study. Conditions necessary for tracing the change in teacher directness and indirectness include finding a teacher who does modify his interaction pattern from one period to the next. It is also necessary to design a method of recording and storing interaction data within particular time-use periods which are presumed to be logically related to variation in teaching behavior.

In the sixth grade project the necessary conditions for a fair test of Hypotheses B and A could not be achieved. The self-contained classroom, the lack of a specific unit of study, and the necessary reliance on nationally standardized tests of achievement do provide an opportunity to study flexibility, as a feature of teaching behavior, but these conditions fail to permit an analysis of change in flexibility and to study the lawfulness of these changes--if any. Faced with this mismatch between the information being sought and the research design, the research team resolved to conduct the fourth grade study in a different manner and to at least look at some of the time-use categories which were available within the sixth grade data. It also seemed possible that the best classrooms for this part of the study would be those whose teachers scored high in flexibility or were at least above average in the i/d ratio.

The results of testing Hypotheses B and A:--Put briefly, the results are not significant, for the most part, in both the statistical as well as the theoretical meaning of the term. An example of one analysis can be found in Table 3-9. Here the i/d ratios are compared separately for old and new material. This means that when a classroom observer decided that new subject matter and plans for new work projects were being discussed, the interaction data which were high on both achievement and positive attitude scores are contrasted with those which were low on both measures. The trends with regard to Hypotheses B and A are not significant. The tendency of higher i/d ratios for classes with higher scores on positive pupil attitudes and adjusted achievement is of no consequence for this comparison.

Other comparisons between the more flexible and less flexible teachers and between pairs of teachers with equally high i/d ratios yielded equally non-significant results.

TABLE 3-9

DIFFERENCES BETWEEN MEAN i/d RATIOS IN 6TH GRADE

Class Level	Teacher Number	i/d Ratios by Time-Use Category		Test of Significance
		New Material	Old Material	
High	89	2.28	4.61	Between Categories $t = -0.3969$ N.S.
	13	0.88	1.75	
	50	3.44	1.88	
	30	1.59	1.63	
	08	1.24	1.29	
	24	1.12	1.51	
	37	0.69	1.52	
	64	3.11	1.62	
	27	2.23	2.76	
	77	0.76	0.61	
	Mean	$\bar{x} = 1.7340$	$\bar{x} = 1.9180$	
Low	26	1.60	3.60	Between Categories $t = 0.3843$ N.S.
	91	0.57	0.59	
	00	1.88	1.61	
	42	0.64	1.12	
	19	1.08	0.71	
	51	1.36	1.58	
	95	1.47	0.60	
	75	0.33	0.30	
	34	1.30	0.88	
	73	0.44	1.00	
	Mean	$\bar{x} = 1.0670$	$\bar{x} = 1.1990$	
Between Levels		$t = 1.8772$ $p < 0.05$	$t = 1.5823$ $p < 0.10$ N.S.	

The Results from the Fourth Grade

The analysis of the four hypotheses in the fourth grade data follows the same sequence that was used in the sixth grade. Because subscripts were used, the interaction analysis data include variables based on subdivisions of Category Three. It should also be remembered that a two-week social studies unit on New Zealand was the subject matter being taught. This unit of study provides a better opportunity to operationalize "new material" and "old material" and, in other ways, to distinguish different phases of the learning process.

Indirectness in All Phases of Classroom Interaction

Hypothesis D states that there will be a higher proportion of indirect influence during all phases of instruction when classes which score higher on positive pupil attitudes and achievement adjusted for initial ability are compared with lower-scoring classes. The basic data for the sixteen fourth-grade classes is shown in Table 3-10.

The contrast with both adjusted achievement and attitude:--When the contrast is based on both attitude and achievement, it turns out that only six classes can be compared with another six. To be included, each class must be above or below the median on both adjusted achievement and positive pupil attitude. The basis of selection is shown in Table 3-11.

There is no special merit in reducing the sample from sixteen classes to twelve in order to test this hypothesis. The contrast of six classes above the median in both attitude and achievement with the six below would be more interesting if a stronger relationship was revealed or if this comparison alone achieved a difference which was significant. Neither of these outcomes occurred and, therefore, this analysis with a reduced sample is reported here only to be complete.

Table 3-12 shows the results of four t-tests which make use of one-tailed probability norms. The first variable is the i/i + d ratio. The second and third variables are based on category subscripts which were used during the coding of verbal communication. Category 31 is used to code the superficial recognition of a pupil's idea--usually a teacher merely repeats what the pupil has said. Category 32 is more active and refers to accepting and making use of the ideas expressed by pupils. Category 33 refers to the extended use of pupil ideas, especially comparing one pupil's idea to those of another. Category 34 refers to the teacher asking questions which are based on and make use of ideas expressed by pupils. The variable called "All 3's" refers to the total Category 3 frequency, that is, the sum of 31 + 32 + 33 + 34.

The results shown in Table 3-12 indicate that when indirectness is quantified by the i/i + d and by tallies per thousand in Categories 33 + 34, the differences could be expected to occur by chance a little less than five times per hundred. When indirectness is quantified by the

TABLE 3-10

BASIC DATA FOR GRADE FOUR

Teacher number	First attitude	Attitude average for 3 administrations	Adjusted class mean achievement	1/(i+d) ratio	33 + 32	33 + 34	All 3's	Flexibility index
036	130	105.19	24.95	.600	38	8	46	87.6
025	128	104.46	23.65	.341	43	15	58	80.4
015	134	106.54	22.97	.580	51	23	74	96.0
011	133	110.93	22.43	.649	57	36	93	85.2
018	112	85.48	21.97	.551	31	13	44	55.2
022	121	98.00	21.40	.571	57	22	79	136.8
013	122	98.44	21.15	.615	69	34	103	54.0
019	133	103.85	21.00	.709	74	15	89	117.6
032	123	95.31	20.85	.317	31	19	50	49.2
068	121	98.16	18.81	.467	33	3	36	60.0
040	97	70.55	18.53	.202	13	1	14	24.0
026	132	108.24	18.00	.623	58	23	81	70.8
048	110	104.32	17.28	.479	42	6	48	56.8
024	107	86.57	17.13	.373	31	15	46	64.8
070	111	91.71	13.72	.656	45	19	64	67.2
058	111	81.24	13.42	.439	35	4	39	64.8

TABLE 3-11

CLASSES WHICH ARE EITHER ABOVE OR BELOW THE GRAND MEDIAN (OF 16 CLASSES) IN BOTH ATTITUDE AND CONTENT ACHIEVEMENT

Teacher Number	Attitude Rank	Adjusted Achievement Rank	Average Rank
	High in Attitude and Achievement		
11	1	4	2.5
36	4	1	2.5
15	3	3	3.0
25	5	2	3.5
19	7	8	7.5
13	8	7	7.5
	Low in Attitude and Achievement		
68	9	11	10
32	11	9	10
70	12	15	13.5
24	13	14	13.5
40	16	12	14
58	15	16	15.5

tallies per thousand in Categories 31 + 32 or all Category 3, then the differences between the two groups of classes could be expected by chance less than one time per hundred. These differences can be called "statistically significant" by current convention and are in the right direction to support Hypothesis D.

Attitude and achievement taken separately:--The raw data for a separate comparison of attitude and achievement can be found in Table 3-10. Four comparisons of the top and bottom eight classes based on achievement, adjusted for initial ability, are shown in Table 3-13. The same comparisons based on attitude are shown in Table 3-14. These comparisons are in a direction which supports Hypothesis D and in all but one case are not likely to be due to chance. Just how much confidence one might have in this finding is up to the reader. Given the results in the sixth grade and in other studies reviewed by Flanders (1970) these fourth grade findings are consistent. However, there is the question of practical significance. What does it mean, for example, that in classrooms where adjusted achievement is above average we can expect the incidence of Category 3 statements to be about 73 per thousand tallies, but in classrooms which are below average this same incidence is about 47 per thousand? If percent is more familiar than millage, one can say 7.3 percent compared with 4.7 percent. Both of these percents are low compared with other samples, for

TABLE 3-12

TEACHER INDIRECTNESS AS MEASURED BY i/i+d AND BY CATEGORY THREE, GROUPED ON ATTITUDE AND ACHIEVEMENT, WITH SUMMARY STATISTICS[b]

Levels--Attitude and Achievement	Teacher Number	i/i+d Ratio[a]	Tallies per Thousand		
			31 + 32	33 + 34	All 3's
High	11	.649	57	36	93
	36	.600	38	8	46
	15	.580	51	23	74
	25	.341	43	15	58
	19	.709	74	15	89
	13	.615	69	34	103
Mean		0.582	55.33	21.83	77.17
Low	68	.467	33	3	36
	32	.317	31	19	50
	70	.656	45	19	64
	24	.373	31	15	46
	40	.202	13	1	14
	58	.439	35	4	39
Mean		0.409	31.33	10.17	41.50
s_1^2 =		0.013	168.23	105.81	401.15
s_2^2 =		0.020	89.89	58.81	231.92
t =		2.134*	3.341**	2.034*	3.170**
p <		0.05	0.005	0.05	0.005

* $t_{.05}$ (10 d.f.) = 1.812

** $t_{.005}$ (10 d.f.) = 3.169

[a] 1 + 2 + 3/1 + 2 + 3 + 6 + 7, Flanders' category system

[b] All tests are one-tailed test.

TABLE 3-13

DIFFERENCES BETWEEN AVERAGE CLASS MEASURES OF INDIRECTNESS CLASSES DIVIDED ON ACHIEVEMENT (16 CLASSES SPLIT AT MEDIAN)

Class Level	N	Mean			
		i/i+d Ratio	31 + 32	33 + 34	All 3's
High	8	0.577	52.50	20.75	73.25
Low	8	0.445	36.00	11.25	47.25
Difference		0.132	16.50	9.50	26.00
t =		2.027	2.363	2.028	2.488
p <		.05	.02	.05	.02

TABLE 3-14

CLASSES DIVIDED ON ATTITUDE (16 CLASSES SPLIT AT MEDIAN)

Class Level	N	Mean			
		i/i+d Ratio	31 + 32	33 + 34	All 3's
High	8	0.575	54.00	20.00	74.00
Low	8	0.447	34.50	12.00	46.50
Difference		0.128	19.50	8.00	27.50
t =		1.929	3.044	1.639	2.703
p <		0.05	0.005	0.10 (NS)	0.01

instance, an average of about 8 percent has been reported elsewhere (Flanders, 1965). It may well be that our fourth grade sample of teachers were less indirect than some other samples which have been studied.

The Analysis of Flexibility

The concept flexibility refers to variation in the patterns of verbal communication which involve the teacher. In the past, the range or the standard deviation of a teacher's i/d ratios has been used as an index of flexibility. There can be several i/d ratios for a single teacher because one can be calculated for a single visit, each subject that is taught, or for each of the different phases of learning. The rationale behind this method of quantification is that as the purposes of instruction change the patterns of interaction will vary in terms of indirectness, one situation compared to another.

George Miller (1969) has proposed another method of quantifying flexibility. He reasoned that a teacher may be shifting back and forth between more direct and more indirect patterns in nearly all phases of teaching. When interaction data are tabulated in a matrix using pairs of events, certain pairs are logically associated with changing indirectness while others are not. His method of quantifying flexibility is to set up a ratio such that the logically related pairs are in the numerator and the total tallies of the matrix are in the denominator. He called his ratio the Miller Flexibility Ratio (MFR) and calculated it by placing the following cell frequencies in the numerator: 4-3 + 5-3 + 8-3 + 3-4 + 3-5 + 4-9 + 9-5. The MFR is found by dividing the foregoing sum by all tallies and then multiplying by a constant (1,200) in order to avoid very small numbers.

Hypothesis C states that greater flexibility is expected in classrooms in which scores on adjusted achievement and positive pupil attitudes are higher. The evidence seems to be more consistent in the case of achievement than for positive attitudes. Table 3-15 shows the t-tests for both achievement and attitude, all classes divided by a median split. In the case of twelve classes which can be compared six against six, based on both achievement and attitude, the high mean is 86.8, the low mean is 55.0, the t value is 2.939, and p = 0.01. Taken all together, the tests would support Hypothesis C for achievement, but not for attitude.

TABLE 3-15

DIFFERENCES BETWEEN CLASS MEAN ON MILLER FLEXIBILITY RATIO (MFR)

Class Level	Classes Divided on Both Achievement and Attitude		Classes Divided on Achievement Only		Classes Divided on Attitude Only	
	N	MFR	N	MFR	N	MFR
High	6	86.8	8	89.1	8	81.3
Low	6	55.0	8	57.5	8	65.3
Difference		31.8		31.6		15.0
$\underline{t}$ =		2.939		2.365		1.191
p =		0.01**		0.025*		0.15 N.S.

$^{*}\underline{t}_{.025}$ (7 df) = 2.365 $^{**}\underline{t}_{.01}$ (10 df) = 2.764

All tests are one-tailed.

Part of the problem is unusually high ratios for two classes, numbered 19 and 22 (see Table 3-10). These classes contribute to a high variance within the sample and raises some questions about the stability of this variable.

Changes in Teacher Indirectness During Instruction

Hypotheses A and B are concerned with predicting changes in teacher indirectness when new material is being introduced--compared with old material, when the initial phases of learning are compared with later phases of learning, and similar changes in educational purpose and setting.

The particular predictions made in Hypotheses A and B were that the interaction in classes that were above average in achievement and positive pupil attitudes would gradually shift from less direct to more direct patterns as new material gave way to old and that the reverse trend, from more direct to less direct, would occur in the below average classes. These hypotheses were tested in a number of ways, but no strong support for either Hypothesis A or B was found. The data in Table 3-16 is a typical example. Mere inspection of the means shows that the theory is not supported. All teachers are slightly more direct during the last few days compared with the first few days. There are no significant differences among the two variables when classes above and below average in achievement are compared. The significant differences which are shown support Hypothesis D, but not Hypotheses A and B. The other analyses are not shown since they do not contribute new information to this discussion.

Summary of Grade Level Four

The results of analyzing the data from the fourth grade provide some support for Hypotheses D and C and fail to provide support for Hypotheses A and B.

The reader will note that teacher indirectness has been quantified by several different procedures. They include the i/i + d, all Category 3, 31 + 32, 33 + 34, and, in Table 16, the frequency of the (3-3) cell divided by the combined frequencies of the (3-3) + (7-7) cells. This latter variable was suggested by Dr. Barak Rosenshine, Temple University. One weakness of this last procedure is illustrated by the scores of the three teachers numbered 11, 15, and 26 who are at the ceiling, 1,000. This highest possible score occurs when the frequency of the (7-7) cell is zero. Since ceiling scores are undesirable in this research application, it may be that this method of quantifying indirectness should be reserved for matrix data which are accumulated over longer periods of time, long enough, at least, to record some instances in which a teacher criticized a student for longer than the three-second single tally period.

TABLE 3-16

FOURTH-GRADE TEACHER INDIRECTNESS FOR TWO PERIODS OF OBSERVATION

Achievement Level	Teacher Number	i/i+d Ratio		(3-3)/[(3-3)+(7-7)]	
		First Two Days	Last Two Days	First Two Days	Last Two Days
Upper Half	36	.613	.673	.917	.552
	2	.421	.302	.677	.161
	15	.580	.418	1.000	1.000
	11	.717	.839	1.000	.913
	18	.598	.512	.778	.667
	22	.430	.741	.882	.938
	13	.676	.318	.961	.932
	19	.652	.791	.722	.735
Mean		.586	.574	.868	.737
Lower Half	32	.353	.293	.289	.115
	26	.666	.465	1.000	.909
	68	.672	.528	.429	.750
	40	.215	.102	.094	.000
	48	.331	.341	.235	.333
	24	.517	.321	.864	.375
	58	.557	.381	.200	.500
	70	.690	.574	.889	.700
Mean		.500	.375	.500	.460
By Level	$s_1^2 =$	.0103	.0403	.0139	.0687
	$s_2^2 =$	.0285	.0196	.1135	.0874
	$\underline{t} =$	1.1534 N.S.	2.1493**	2.7301***	1.8553*
	$\underline{p} =$	0.15	0.025	0.025	0.05

$^{*}\underline{t}_{.05}(14\text{ df}) = 1.761$

$^{**}\underline{t}_{.025}(14\text{ df}) = 2.145$

$^{***}\underline{t}_{.025}(7\text{ df}) = 2.365$ Because homogeneity of variance cannot be assumed, $\underline{t}'$ ($\underline{t}$ with (n-1) degrees of freedom) is used in this case.

Results for the Second Grade

The one year project at the second grade level was destined to be unsatisfactory because the interaction patterns of the classes which we observed were too similar. An old truism about research is that a variable must vary in order to study its associations with other variables. For example, the variation of i/i + d within the second grade sample has a very narrow range which extends from 0.115 to 0.390. These figures show that no teacher, in this sample, made as many indirect statements as direct during the periods that our observers were coding interaction. This narrow range meant that all four hypotheses are not likely to receive a fair test and that special statistical procedures would be necessary to tease out trends that might support or reject our hypotheses. In spite of poor results, this report of the second grade is interesting partly because some of our staff statisticians carried out unusual analyses of the data.

General Considerations of the Data

Achievement was measured with the Stanford Achievement Test, Primary Battery I. Three subtests were used: Paragraph Meaning, Word Study Skills, and Arithmetic Problem Solving. Each subtest was altered either by reducing the time required for administration or the number of items. The modified tests were administered twice--the pretest, during the first week in November; and the posttest, during the second week in March.

Initially, the tests were scored by counting the number of items an individual student marked correctly on each subtest. After it was observed that the items differed in the extent to which they discriminated top and bottom scorers, a weighting procedure was developed. An item analysis of each subtest for a sample of 250 prescores and postscores was conducted, and each item was weighted according to the degree to which the item discriminated the upper and lower third of the sample, i.e., an item which discriminated very well, the upper and lower was given a greater weight than an item which did not discriminate between the upper and lower thirds. The weights assigned to the items varied from one to four. Actually, most items were weighted two, three, or four. Since the more difficult items generally discriminated between the top and bottom groups more effectively, the result of the weighting procedure was to give more weight to the more difficult items. A description of the weighting procedured followed can be found in Guilford's book, Psychometric Methods in the chapter on item analysis.

It was observed that there were some students who were either at or approaching the ceiling on one or several of the subsets. Since valid measures of gain for these students could not be obtained, they were removed from the analysis for the particular subtest on which they approached or reached the ceiling. By approach or reach the ceiling on the various subtests it meant the following: on the paragraph meaning subtest a score greater than 104 is considered at or near the ceiling (110 is the ceiling). At or near the ceiling of the word study skills subtest is considered a score greater than 77 (maximum score = 84), while on the arithmetic problem solving subtest a student was removed if his score was greater than 37 (maximum score = 42). These cutoff points mean that a student had to be at least two or three items away from the top score on the pretest in order to be included in the sample. Students who reached the ceiling on the posttest but had not done so on the pretest were included in the analysis of the data. In two or three classes as many as five or six students attained the ceiling or near the ceiling on one of the pretests, but generally this was not the case on the other pretests for the class. Table 3-17 lists numbers of students reaching the ceiling or near the ceiling on the pretest.

TABLE 3-17

ACHIEVEMENT PRETESTS: TOTAL NUMBER OF STUDENTS PER CLASS INVOLVED
NUMBER WITH OR NEAR CEILING SCORE, FINAL
NUMBER OF STUDENTS PER CLASS

Teacher Number	Paragraph Meaning			Word Study Skills			Arithmetic Problem Solving		
	Total N	Ceiling N	Final N	Total N	Ceiling N	Final N	Total N	Ceiling N	Final N
1	19	0	19	19	0	19	19	0	19
2	26	0	26	26	0	26	26	0	26
3	29	3	26	29	2	27	29	1	28
4	23	0	23	23	0	23	23	2	21
5	26	1	25	26	1	25	26	0	26
6	18	0	18	18	0	18	18	0	18
7	24	3	21	24	2	22	24	5	19
8	24	2	22	24	1	23	24	2	22
9	26	3	23	26	2	24	26	6	20
10	29	3	26	29	3	26	29	0	29
11	22	1	21	22	4	18	22	4	18
14	21	2	19	21	0	21	21	1	20
15	22	3	19	22	0	22	22	3	19
16	22	3	19	22	3	19	22	2	20
17	24	4	20	24	2	22	24	5	19

After summary data on the weighted scores for the individual's pre- and posttests were compiled, the adjusted posttest scores were computed. This was done by computing the regression line between preachievement and postachievement, with postachievement as the dependent variable and preachievement as the independent variable. Class mean pre- and postachievement scores are presented in the Appendix.

Final class mean achievement scores, adjusted for initial achievement, are presented in Table 3-18.

TABLE 3-18

SECOND GRADE MEANS FOR EACH CLASS FINAL ACHIEVEMENT ADJUSTED FOR INITIAL ACHIEVEMENT[a]

Teacher Number	Paragraph Meaning			Word Study Skills			Arithmetic Problem Solving		
	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
1	67.48	17.47	19	57.92	12.53	19	26.49	10.04	19
2	70.14	24.85	26	58.26	11.26	26	32.20	8.56	26
3	74.21	18.44	26	58.97	10.04	27	29.32	8.88	28
4	70.80	13.37	23	60.93	8.71	23	28.26	9.83	20
5	76.43	16.43	25	63.82	7.18	25	28.88	7.37	28
6	61.68	13.03	19	59.20	7.55	19	28.30	4.99	19
7	72.24	12.32	19	63.22	4.93	21	28.57	5.36	17
8	64.25	14.09	21	62.46	9.58	22	21.59	6.11	20
9	85.48	17.53	23	64.39	6.85	24	27.65	6.16	21
10	81.92	18.82	26	64.32	7.52	26	28.31	7.98	29
11	83.22	15.88	21	61.26	8.27	18	30.76	7.48	18
14	61.48	17.68	19	67.04	8.17	21	31.94	7.48	20
15	81.17	14.73	19	62.43	5.45	22	30.53	5.94	19
16	81.05	18.07	20	64.27	7.77	19	25.49	6.39	20
17	75.48	12.94	19	64.09	5.66	21	27.50	6.46	18

[a] Students at or near ceiling on pretest are removed; that is also why the n's for a class differ from one test to another.

In order to examine the relationship between pupil attitudes and teacher indirectness, an analysis of variance on initial and final attitude scores was carried out. It was decided to divide the 15 classes into three "treatment" groups called high, medium, and low, based on the i/i + d ratio, shown in Table 3-19. Classes were selected in their rank order first for the high group, 11, 4, 2, 7, and 16; second for the medium group: 3, 6, 9, 5, and 17; and third for the low group: 8, 10, 14, and 15. This member of our staff decided to assume that each group of classes was a homogeneous treatment group and carried out the analysis of variance with degrees of freedom based on the total number of pupils in each treatment group. Making this assumption is a controversial step because when it is incorrect, the result of the statistical test is biased toward rejecting the null hypothesis and inferring that differences are greater than would be expected by chance. The mean initial attitude scores for the three "treatment" groups are shown in Table 3-20, and the results of the analysis of variance on initial attitude is shown in Table 3-21. The results show that there were no significant differences among the three groups for initial attitude. Table 3-22 shows the mean final attitude scores for the three groups and Table 3-23 shows the analysis of variance for the final attitude measure. The difference is in the right direction when the lowest group is compared with the other two.

TABLE 3-19

i/i+d, ALL OBSERVATIONS

Teacher Number	i/i+d	i/i+d Rank
1C	.269	12
2A	.349	3
3B	.306	6
4A	.363	2
5B	.296	9
6B	.304	7
7A	.334	4
8C	.270	11
9B	.304	8
10C	.267	13
11A	.390	1
14C	.246	14
15C	.115	15
16A	.322	5
17B	.290	10

TABLE 3-20

MEAN INITIAL ATTITUDE SCORES OF GROUPS AT i/i + d LEVELS

i/i+d Level (Group)	Mean Attitude Score	N
High	5.32	99
Medium	5.34	113
Low	5.25	108

TABLE 3-21

ANALYSIS OF VARIANCE OF INITIAL ATTITUDE MEASURE WITH i/i+d AS THE INDEPENDENT VARIABLE

Source of Variation	df	SS	MS	F	p
Between groups	2	.51	.26	.33	NS
Error	317	243.08	.77		
Total	319	243.59			

TABLE 3-22

MEAN FINAL ATTITUDE SCORES OF GROUPS AT i/i + d LEVELS

i/i + d Level (Group)	Mean Attitude Score	N
High	5.29	99
Medium	5.37	113
Low	5.04	108

TABLE 3-23

ANALYSIS OF VARIANCE OF FINAL ATTITUDE MEASURE WITH i/i+d AS THE INDEPENDENT VARIABLE

Source of Variation	df	SS	MS	F	p
Between Groups	2	6.54	3.27	3.09*	p < .05
Error	312	331.54	1.06		
Total	314	338.08			

$^*F_{.95}\ (2,312) = 3.03$

The F test indicates that these differences barely meet the p = 0.05 standard and this is possible only by assuming more degrees of freedom in the manner mentioned above.

The most reasonable inference to make is that these data show no convincing relationship between the interaction analysis variable i/i + d and a measure of positive pupil attitudes although a trend for the bottom group is present.

Many different statistical analyses were made to investigate associations between interaction variables and measures of achievement. Separate scores for paragraph meaning, word study skills, and arithmetic problem solving permitted a separate analysis for each topic. Some of the variables which were investigated included I/I + D and i/i + d for all phases of instruction and the same variables based only on interaction which occurred when the topic being studied by the class was the same as the achievement test. Thus, when arithmetic was being taught, the interaction data were tabulated separately and used to determine the indirectness of teacher participation for that particular subject only. Similarly, instruction in reading was used for association with scores on paragraph meaning, and language arts lessons were associated with scores on the word study skills section of the test.

The results of these various tests are inconclusive. Out of a total of twenty-one separate analyses of variance fifteen are not significant, two are significant in a direction supporting Hypothesis D, and four are significant in a direction that is the opposite. Three of the four in the wrong direction used word study skills as the measure of achievement. Some examples of these analyses are now presented primarily to illustrate some of the procedures.

The teacher numbers in the high, medium, and low indirectness groups (i/i+d) for each subtest are as follows:

Subtest	Level of Indirectness	Teacher Numbers
	High	7, 4, 5, 11, 16
Paragraph Meaning	Medium	2, 9, 6, 10, 3
	Low	8, 14, 15, 17, 1
	High	11, 2, 3, 17, 8
Word Study Skills	Medium	4, 6, 10, 9, 14
	Low	1, 5, 7, 15, 16
	High	3, 4, 11, 16
Arithmetic	Medium	6, 7, 17, 10, 14, 2
Problem-Solving	Low	5, 9, 8, 15

The analysis of covariance was used to examine relationships between pupil achievement and level of teacher indirectness. The i/i + d ratio was used as the independent variable, initial achievement as the covariate, and final achievement as the outcome variable. The mean final achievement scores of the three groups--with initial achievement controlled--and the results of the analyses are presented in Tables 3-24 to 3-29.

TABLE 3-24

MEAN FINAL ACHIEVEMENT SCORES OF GROUPS AT i/i+d LEVELS, WITH INITIAL ACHIEVEMENT CONTROLLED--PARAGRAPH MEANING

i/i+d Level (Group)	Mean Final Achievement Score	Adjusted Mean Achievement Score	N
High	77.07	72.17	91
Medium	70.15	71.19	102
Low	62.13	66.26	108

TABLE 3-25

ANALYSIS OF COVARIANCE OF FINAL ACHIEVEMENT, WITH INITIAL ACHIEVEMENT CONTROLLED--PARAGRAPH MEANING

Source of Variation	df	SS	MS	F	p
Between Groups	2	6.5	3.27	3.08*	$p < .05$
Error	312	331.54	1.06		
Total	314	338.08			

*$F_{.95}$ (2, 312) = 3.03

TABLE 3-26

MEAN FINAL ACHIEVEMENT SCORES OF GROUPS AT i/i+d LEVELS, WITH INITIAL ACHIEVEMENT CONTROLLED--WORD STUDY SKILLS

i/i+d Level (Group)	Mean Final Achievement Score	Adjusted Mean Achievement Score	N
High	62.04	59.54	113
Medium	60.08	62.13	112
Low	60.74	61.25	104

TABLE 3-27

ANALYSIS OF COVARIANCE OF FINAL ACHIEVEMENT, WITH INITIAL ACHIEVEMENT CONTROLLED--WORD STUDY SKILLS

Source of Variation	df	SS	MS	F	p
Between Groups	2	376.74	188.37	2.62	NS ($.05 < p < .10$)
Error	325	23374.45	71.92		
Total	327	23751.19			

TABLE 3-28

MEAN FINAL ACHIEVEMENT SCORES OF GROUPS AT i/i+d LEVELS, WITH INITIAL ACHIEVEMENT CONTROLLED--ARITHMETIC PROBLEM SOLVING

i/i+d Level (Group)	Mean Final Achievement Score	Adjusted Mean Achievement Score	N
High	28.09	27.56	87
Medium	26.88	27.72	128
Low	26.69	25.96	86

TABLE 3-29

ANALYSIS OF COVARIANCE OF FINAL ACHIEVEMENT, WITH INITIAL ACHIEVEMENT CONTROLLED--ARITHMETIC PROBLEM SOLVING

Source of Variation	df	SS	MS	F	p
Between Group	2	177.01	99.50	1.77	NS
Error	297	14836.77	49.96		
Total	299	15013.78			

Hypothesis D was also tested by doing an analysis of variance of final achievement scores, using initial achievement as the matching variable. The i/i+d ratio which was computed from those observations in which the activity was relevant to the subtest, i.e., reading observations were used to define the ratio for the paragraph meaning subtest, language arts observations for the word study skills subtest, and arithmetic observations for the arithmetic problem-solving subtest. The classes were set up in blocks based on initial achievement. Teacher 01 had no arithmetic observation data; therefore, in order to assign classes to blocks of three, the two lowest teachers (in terms of number of tallies) were not included in the analysis for the arithmetic problem-solving subtest. This leaves four blocks of three teachers per block for the arithmetic problem-solving subtest, while the other two analyses have 5 x 3 blocks.

Data used for the analysis of variance are presented in Table 3-30. Results of the analyses of variance are presented in Tables 3-31, 3-32 and 3-33.

The data in Table 3-31 illustrates a significant outcome in the predicted direction.

The results of Table 3-32 show differences between classes of indirect teachers and classes of direct teachers for achievement in word

TABLE 3-30

TEACHERS IN EACH BLOCK AND COLUMN--BLOCKED ON INITIAL ACHIEVEMENT

Block	i/i+d Levels			i/i+d Ratios		
	High	Medium	Low	High	Medium	Low
			Paragraph Meaning			
1	7	17	15	.419	.197	.087
2	11	10	3	.382	.235	.232
3	16	9	8	.371	.316	.217
4	5	4	14	.436	.412	.210
5	2	6	1	.335	.289	.176
			Word Study Skills			
1	11	9	7	.436	.245	.230
2	3	17	15	.369	.346	.125
3	8	10	16	.324	.253	.238
4	2	4	5	.395	.271	.199
5	6	14	1	.268	.242	.206
			Arithmetic Problem-Solving			
1	11	7	9	.350	.281	.238
2	3	16	10	.414	.306	.270
3	14	5	15	.266	.255	.125
4	4	6	2	.316	.283	.263

TABLE 3-31

ANALYSIS OF VARIANCE OF FINAL ACHIEVEMENT SCORES, USING INITIAL ACHIEVEMENT AS THE MATCHING VARIABLE--PARAGRAPH MEANING

Source of Variation	df	SS	MS	F	p
		Initial Measure			
Level of Indirectness (i/i+d)--High, Medium, Low--(A)	2	1165.64	582.82	.7176	
Blocks (B)	4	69527.16	17381.79	21.4014	
A x B	8	11240.88	1405.11	1.7302	
Error	334	271268.12	812.18		

TABLE 3-31--Continued

Source of Variation	df	SS	MS	F	p
		Final Measure			
Level of Indirectness (i/i+d)--High, Medium, Low--(A)	2	6709.76	3354.88	4.928*	$p < .01$
Blocks	4	70812.00	17703.00	26.004	
A x B	8	9109.36	1138.67	1.6726	
Error	334	227380.52	680.78		

*$F_{.99}(2,334) = 4.70$

TABLE 3-32

ANALYSIS OF VARIANCE OF FINAL ACHIEVEMENT SCORES, USING INITIAL ACHIEVEMENT AS THE MATCHING VARIABLE--WORD STUDY SKILLS

Source of Variation	df	SS	MS	F	p
		Initial Measure			
Level of Indirectness (i/i+d)--High, Medium, Low--(A)	2	105.20	52.60	.3253	
Blocks (B)	4	21469.32	5367.33	33.1849	
A x B	8	2908.72	363.59	2.248	
Error	335	54182.90	161.74		
		Final Measure			
Level of Indirectness (i/i+d)--High, Medium, Low--(A)	2	816.36	408.18	2.7703	NS($.05<p<.10$)
Blocks (B)	4	14610.96	3652.74	24.7912	
A x B	8	4497.52	562.19	3.8156	
Error	335	49358.90	147.34		

Means of Final Measure: High = 60.05, Medium = 63.66, Low = 61.46

TABLE 3-33

ANALYSIS OF VARIANCE OF FINAL ACHIEVEMENT SCORES, USING INITIAL ACHIEVEMENT AS THE MATCHING VARIABLE--ARITHMETIC PROBLEM-SOLVING

Source of Variation	df	SS	MS	F	p
		Initial Measure			
Level of Indirectness (i/i+d)--High, Medium, Low--(A)	2	34.50	17.25	.2377	
Blocks (B)	3	5848.02	1949.34	26.8652	
A x B	6	409.56	68.26	.9356	
Error	274	19881.44	72.56		
		Final Measure			
Level of Indirectness (i/i+d)--High, Medium, Low--(A)	2	82.12	41.06	.5094	NS
Blocks (B)	3	3902.28	1300.76	16.1385	
A x B	6	34164.00	56.94	.7065	
Error	274	22084.40	80.60		

study skills. The direction of difference is not in the predicted direction and is almost significant.

The results in Table 3-33 show no evidence of difference between classes of indirect teaching and classes of direct teaching when achievement in arithmetic problem-solving is compared.

The results of using an analysis of covariance technique and an analysis of variance technique are similar and fail to support or reject Hypothesis D. There are two main alternatives which can be used to interpret the results. First, Hypothesis D does not hold for second grade, self-contained classrooms. This might be due to complex relationships between the age of the youngsters, the requirements of teaching at that age level, and the traditional methods of teaching. Second, Hypothesis D does hold for second grade classrooms, but this particular study failed to show any such association. This option cannot be ruled out because of the narrow range of i/i + d in our sample. Given our results, the design of the present study unfortunately does not permit us to choose between these two alternatives.

Some further discussion of the two methods of statistical analysis may be helpful. Note that in using an analysis of covariance to adjust final achievement scores in terms of initial achievement it was necessary to eliminate some pupils who scored too high on the initial test. This is only a partial answer to test ceiling. One interesting option with the analysis of variance procedure is that no adjustment for initial ability of the class and no adjustment for test ceiling is necessary. In this procedure, the top three classes on initial achievement are grouped together into one block. They are then assigned to the high, medium, and low treatment condition for indirectness of teaching behavior. The second group of three classes is designated by rank order 4, 5, and 6 on the initial test. They are similarly assigned to the three treatments. The same procedure is continued until all 15 classes are assigned. The first test is then made to see if the differences in the i/i + d ratios between treatments is so small that it could be expected to occur by chance. If the differences are larger than chance, then the assumption of homogeneous treatment groups is more tenable and an analysis of variance is justified since control for initial ability is already taken into account by the method of assigning classes to the blocks. This can also be verified by calculating an analysis of variance between the three treatment groups on their initial achievement scores. Given reasonably good luck in the within block assignments, there should be no significant differences between the three groups on initial mean achievement.

The efficacy of these and other statistical procedures for this kind of research remains to be investigated. However, the need for alternative methods, in the case of the second grade, has brought to light several different procedures which can be investigated in future projects.

Flexibility in the Second Grade Sample

In previous analyses one method of quantifying flexibility of teacher influence has been to use naturally occurring time units which are determined by the observer in order to calculate separate i/i +d ratios or percent occurrence of Category 3. Given a number of such naturally occurring units of interaction, a standard deviation for either basic variable can be calculated for each teacher and this becomes the index of flexibility. In this section a new method of determining an index of flexibility is described. The new method consisted of separating the interaction data for a single teacher into arbitrary five-minute intervals, determine the i/i + d ratio or percent Category 3 for each interval, and then calculate a standard deviation of each set of measures for each teacher. In our second grade sample, the smallest number of five-minute intervals used in any calculation was sixty. The set of flexibility indices produced by this method is shown in Table 3-34 for the fifteen second grade teachers.

The analysis of flexibility using the above indices followed the same procedure described in the last section for analyzing achievement by assigning teachers to a 3 x 5 block design. Teachers are grouped into size three blocks according to rank order of their class on initial achievement. Each class is assigned to the high, medium, and low treatments according to the relative magnitude of their flexibility index. In this manner the high, medium, and low groups in flexibility were formed.

The results of testing pupil attitude scores and three kinds of final achievement with two indices of flexibility are shown in Tables 3-35 to 3-40. None of these tests lends any support to Hypothesis C.

TABLE 3-34

FLEXIBILITY DEFINED AS THE STANDARD DEVIATION (ACROSS SETS OF 99 TALLIES) OF A PARTICULAR CATEGORY OR COMBINATION OF CATEGORIES

Teacher Number	Flexibility in i/i+d	Rank	Flexibility in Category 3	Rank
1	.217	9	3.52	8
2	.275	2	4.62	1.5
3	.280	1	3.50	9.5
4	.260	4	3.98	5
5	.241	7	3.50	9.5
6	.184	14	3.34	12
7	.267	3	4.62	1.5
8	.242	6	4.28	3
9	.207	11	3.44	11
10	.195	13	2.40	14
11	.214	10	3.80	6
14	.197	12	4.24	4
15	.097	15	1.58	15
16	.252	5	3.78	7
17	.233	8	3.24	13

TABLE 3-35

STANDARD DEVIATIONS OF i/i+d, GROUPED BY LEVEL OF FINAL ACHIEVEMENT ON PARAGRAPH MEANING, WORD STUDY SKILLS, AND ARITHMETIC PROBLEM SOLVING

Block[a]	Final Achievement Levels		
	High	Medium	Low
	Paragraph Meaning		
1	.267 (7)[b]	.097 (15)	.233 (17)
2	.214 (11)	.195 (10)	.280 (3)
3	.242 (8)	.252 (16)	.207 (9)
4	.241 (5)	.260 (4)	.197 (14)
5	.275 (2)	.185 (6)	.217 (1)
	Word Study Skills		
1	.267 (7)	.214 (11)	.207 (9)
2	.233 (17)	.097 (15)	.280 (3)
3	.252 (16)	.195 (10)	.242 (8)
4	.241 (5)	.275 (2)	.260 (4)
5	.197 (14)	.184 (6)	.217 (1)

TABLE 3-35--Continued

Block[a]	Final Achievement Levels		
	High	Medium	Low
	Arithmetic Problem Solving		
1	.267 (7)	.207 (9)	.233 (17)
2	.214 (11)	.280 (3)	.252 (16)
3	.097 (15)	.195 (10)	.242 (8)
4	.197 (14)	.241 (5)	.260 (4)
5	.275 (2)	.184 (6)	.217 (1)

[a] Blocked according to initial achievement.

[b] Teacher identification number in parentheses.

TABLE 3-36

ANALYSIS OF VARIANCE OF FLEXIBILITY SCORES (STANDARD DEVIATION OF i/i+d) AS RELATED TO FINAL ACHIEVEMENT

Source of Variation	df	SS	MS	F	p
Paragraph Meaning					
Between Groups	2	.0063	.0031	1.632	NS
Within Groups	12	.0232	.0019		
Total		.0295			
Word Study Skills					
Between Groups	2	.0072	.0036	2.0	NS
Within Groups	12	.0223	.0018		
Total		.0295			
Arithmetic Study Skills					
Between Groups	2	.0024	.0012	.5454	NS
Within Groups	12	.0217	.0022		
Total		.0295			

TABLE 3-37

STANDARD DEVIATIONS OF CATEGORY 3, GROUPED BY LEVEL OF FINAL ACHIEVEMENT ON PARAGRAPH MEANING, WORD STUDY SKILLS, AND ARITHMETIC PROBLEM SOLVING

Block[a]	Final Achievement Levels		
	High	Medium	Low
	Paragraph Meaning		
1	4.62 (7)[b]	1.58 (15)	3.24 (17)
2	3.80 (11)	2.40 (10)	3.50 (3)
3	4.28 (8)	3.78 (16)	3.44 (9)
4	3.50 (5)	3.98 (4)	4.24 (14)
5	4.62 (2)	3.34 (6)	3.52 (1)
	Word Study Skills		
1	4.62 (7)	3.80 (11)	3.44 (9)
2	3.24 (17)	1.58 (15)	3.50 (3)
3	3.78 (11)	2.40 (10)	4.28 (8)
4	3.50 (5)	4.62 (2)	3.98 (4)
5	4.24 (14)	3.34 (6)	3.52 (1)
	Arithmetic Problem Solving		
1	4.62 (1)	3.44 (9)	3.24 (17)
2	3.80 (11)	3.50 (3)	3.78 (16)
3	1.58 (15)	2.40 (10)	4.28 (8)
4	4.24 (14)	3.50 (5)	3.98 (4)
5	4.62 (2)	3.34 (6)	3.52 (1)

[a] Blocked according to initial achievement.

[b] Teacher identification number in parentheses.

TABLE 3-38

ANALYSIS OF VARIANCE OF FLEXIBILITY SCORES (STANDARD DEVIATION OF CATEGORY 3) AS RELATED TO ACHIEVEMENT

Source of Variation	df	SS	MS	F	p
		Paragraph Meaning			
Between Groups	2	3.295	1.647	3.503	NS
Error	12	5.643	.470		.05<p<.10
Total	14	8.938			

TABLE 3-38--Continued

Source of Variation	df	SS	MS	F	p
Word Study Skills					
Between Groups	2	1.504	.752	1.214	NS
Error	12	7.433	.617		
Total	14	8.938			
Arithmetic Problem Solving					
Between Groups	2	.9367	.468	.702	NS
Error	12	8.001	.667		
Total	14	8.9368			

TABLE 3-39

STANDARD DEVIATIONS OF CATEGORY 3, GROUPED ON FINAL ATTITUDE

Block[a]	Final Attitude Levels		
	High	Medium	Low
1	3.50 (3)[b]	3.98 (4)	2.40 (10)
2	3.24 (17)	4.62 (7)	3.50 (5)
3	4.28 (8)	4.62 (2)	3.80 (11)
4	1.58 (15)	3.34 (6)	4.24 (14)
5	3.44 (9)	3.78 (16)	3.52 (1)

[a] Blocked according to initial attitude.

[b] Teacher identification number in parentheses.

TABLE 3-40

ANALYSIS OF VARIANCE OF FLEXIBILITY SCORES (STANDARD DEVIATION OF CATEGORY 3) GROUPED ON FINAL ATTITUDE

Source of Variation	df	SS	MS	F	p
Between Groups	2	1.92	.960	1.64	NS
Error	12	7.02	.585		
Total	14	8.94			

A third definition of flexibility, the Miller Flexibility Ratio (MFR), was also used to test Hypothesis C. The MFR was first introduced in the analysis of the fourth grade.

The classes were divided into two groups on adjusted mean achievement for each of the achievement subtests and on attitude. The seven classes with the highest mean scores on the respective instruments were designated as high achievement or high attitude classes, while the eight classes with the lowest mean scores on the respective instruments were designated as low achievement and low attitude classes (except for arithmetic which has only seven low classes). The *t*-test for difference in means was employed to compare the high groups with the low groups on each measure. Data used for these tests, along with the results, are presented in Tables 3-41, 3-42, 3-43 and 3-44.

TABLE 3-41

ANALYSIS OF FLEXIBILITY SCORES (MFR), GROUPED BY LEVEL OF ADJUSTED FINAL ACHIEVEMENT--PARAGRAPH MEANING

Level of Adjusted Achievement	Teacher Number	MFR
High	9	42.0
	11	69.6
	10	48.0
	15	68.4
	16	106.8
	5	88.8
	17	80.4
Mean		72.00
Low	3	25.2
	7	88.8
	4	57.6
	2	63.6
	1	22.8
	8	39.6
	6	52.8
	14	32.4
Mean		47.85

$s_1^2 = 436.93$ $s_2^2 = 436.48$ $t = 2.15^*$

$^*t_{.025}$ (13 df) = 2.160

TABLE 3-42

ANALYSIS OF FLEXIBILITY SCORES (MFR), GROUPED BY LEVEL OF ADJUSTED FINAL ACHIEVEMENT--WORD STUDY SKILLS

Level of Adjusted Achievement	Teacher Number	MFR
High	14	51.6
	9	51.2
	10	84.0
	16	90.0
	17	130.8
	5	68.4
	7	76.8
Mean		78.97
Low	8	98.4
	15	70.8
	11	81.6
	4	69.6
	6	68.4
	3	57.6
	11	58.0
	2	36.0
Mean		66.30

$s_1^2 = 638.80$ $s_2^2 = 328.39$ $\underline{t} = 1.08$ NS $0.10<p<0.15$

TABLE 3-43

ANALYSIS OF FLEXIBILITY SCORES (MFR) GROUPED BY LEVEL OF ADJUSTED FINAL ACHIEVEMENT--ARITHMETIC PROBLEM-SOLVING

Level of Adjusted Achievement	Teacher Number	MFR
High	2	36.0
	14	58.8
	11	38.4
	15	72.0
	3	40.8
	5	81.6
	7	109.2
Mean		62.40

TABLE 3-43--Continued

Level of Adjusted Achievement	Teacher Number	MFR
	10	45.6
	6	90.0
	4	57.6
	9	27.6
	17	139.2
	1	no data
	16	82.8
	8	57.6
Mean		71.48

$s_1^2 = 629.07$ $s_2^2 = 1149.05$ $\underline{t} = -0.54$ N.S.

TABLE 3-44

ANALYSIS OF FLEXIBILITY SCORES (MFR), GROUPED BY LEVEL ON ATTITUDE

Level of Attitude	Teacher Number	MFR
High	3	42.0
	17	106.8
	7	86.4
	4	51.6
	10	55.2
	8	78.0
	15	75.6
Mean		70.80
Low	9	43.2
	2	56.4
	1	69.6
	6	79.0
	14	45.6
	5	80.4
	16	98.4
	1	43.2
Mean		64.47

$s_1^2 = 436.52$ $s_2^2 = 371.70$ $\underline{t} = 0.58$ NS

When the MFR is used to quantify flexibility, the results provide evidence that greater flexibility in teaching behavior is associated with higher achievement in paragraph meaning. No relationships between flexibility and other class measures including word study skills, arithmetic problem solving, and attitude appear.

In general, Hypothesis C is not supported by the evidence available in our second grade sample. Just as was true of Hypothesis D, we cannot determine whether the hypothesis does not hold or whether our design to investigate the hypothesis was inadequate.

Variation in Teaching Behavior When Goals are Clear and Unclear

For this analysis, Hypotheses A and B are combined to read: compared with teachers in whose classes content achievement and attitudes are below average, teachers in whose classes these measures are above average will be the least direct in their teaching behavior during activities in which the goals are less clear and among the most direct in teaching behavior during those activities in which the goals are clearer. Goals are described as being somewhat unclear during getting-ready activities and generally becoming more clear during discussion activities. Two groups of teachers were selected for comparison--one group consisting of teachers who are among the most direct in their teaching behavior during discussion activities and among the most indirect during getting-ready activities; the other group consisting of teachers whose teaching behavior is comparatively direct during getting-ready activities and less direct than the other teachers during discussion activities. To locate such a sample of teachers the i/i+d ratio was computed for all the observations during getting-ready activities and again for all the observations during discussion activities. The i/i+d ratios for each of the teachers in the two activity periods are listed in Table 3-45. The teachers were rank-ordered according to i/i+d ratio in each of the activities. The rank orders within each activity were compared, and teachers were selected who, when compared with the other teachers, were both more direct during the getting-ready activities and more indirect during the discussion activities. These were teachers numbered 2, 7, and 16. Also selected for the analysis were teachers who were among the most indirect in teaching behavior during the getting-ready activities as compared to the other teachers as well as among the most direct during the discussion activities when compared with the other teachers. These teachers were numbered 9, 10, and 14. It is predicted that content achievement and attitudes of students in classes 9, 10, and 14 will be higher than in classes 2, 7, and 16.

The results (Tables 3-46 and 3-47) are as predicted when the groups of classes are compared on achievement in word study skills, while no differences appear when the groups of classes are compared on achievement in paragraph meaning and arithmetic problem-solving.

The attitude scores of the classes were also examined. Mean scores of the two groups of classes being compared are presented in Table 3-48.

TABLE 3-45

i/i+d RATIOS DURING GETTING-READY ACTIVITIES AND DURING DISCUSSION ACTIVITIES

Teacher Number	Getting-ready Activities		Discussion Activities	
	i/i+d	Rank	i/i+d	Rank
1	.122	10	.355	9
2	.034	15	.489	3
3	.259	2	.423	6
4	.180	3	.515	1
5	.130	8	.356	7
6	.102	11	.332	12
7	.091	13	.503	2
8	.138	7	.351	8
9	.147	6	.335	11
10	.164	5	.283	14
11	.371	1	.435	5
14	.166	4	.303	13
15	.051	14	.129	15
16	.126	9	.461	4
17	.093	12	.350	10

TABLE 3-46

MEANS ON FINAL ACHIEVEMENT SCORES, ADJUSTED FOR INITIAL ACHIEVEMENT FOR TWO GROUPS OF CLASSES DIVIDED ON TEACHER INFLUENCE PATTERNS[a]

Group	Mean	Adjusted Mean	N
Paragraph Meaning			
A (2, 7, 16)[b]	72.92	73.74	63
B (9, 10, 14)	76.62	75.86	68
Word Study Skills			
A (2, 7, 16)	59.95	59.66	64
B (9, 10, 14)	64.34	64.60	71
Arithmetic Problem-Solving			
A (2, 7, 16)	26.00	26.69	64
B (9, 10, 14)	28.88	28.24	69

[a] Group A--higher direct teacher influence in getting-ready activities, higher indirect in discussion activities. Group B--higher indirect in getting-ready activities, higher direct in discussion activities.

[b] Teacher identification number in parentheses.

TABLE 3-47

ANALYSIS OF COVARIANCE ON FINAL ACHIEVEMENT SCORES, ADJUSTED FOR INITIAL ACHIEVEMENT FOR TWO GROUPS OF CLASSES DIVIDED ON TEACHER INFLUENCE PATTERNS[a]

Source of Variation	df	Adjusted SS	MS	F	p
		Paragraph Meaning			
Between Groups	1	147.63	147.63	.40	NS
Error	128	46835.87	365.91		
Total	129				
		Word Study Skills			
Between Groups	1	822.82	822.82	8.06*	p<.01
Error	132	13473.20	102.07		
Total	133				
		Arithmetic Problem-Solving			
Between Groups	1	78.27	78.27	1.51	NS
Error	130	6729.94	51.77		
Total	131				

[a] Group A--higher direct teacher influence in getting-ready activities, higher indirect in discussion activities. Group B--higher indirect in getting-reading activities, higher direct in discussion activities.

$^{*}F_{.99}(1,132) = 6.84$

TABLE 3-48

MEAN ATTITUDE SCORES FOR TWO GROUPS OF CLASSES DIVIDED ON TEACHER INFLUENCE PATTERNS[a]

Group	Mean Initial Attitude Scores	Mean Final Attitude Scores
A (2, 7, 16)	5.22	5.22
B (9, 10, 14)	5.17	5.24

[a] Teacher identification numbers are in parentheses.

Inspection reveals the scores to be almost identical, so no analysis was performed.

The results provide evidence that, for classes in which the teachers are among the most indirect in their teaching behavior during getting-ready activities and among the most direct during discussion activities, the word study skills subtest is the only one on which final adjusted achievement is greater than it is for classes in which the patterns of teaching behavior are the reverse of those described above. When the same two groups of classes are compared on the basis of attitude, no difference appears.

In the analysis of data gathered in the second grade, Hypotheses A and B are supported only when classes are compared on achievement in word study skills.

Summary of the Second Grade Data

In general, the results of analyzing the second grade data do not support the four hypotheses of this study. It was pointed out that the variation between classes of the interaction variables was very small. In terms of previous research, there is an absence of more indirect teaching patterns in our sample, and with one exception, no really direct teaching patterns. This narrow range was less pronounced in the sixth and fourth grades, age levels at which it was possible to administer an attitude test in order to select classrooms with more pronounced differences in their interaction patterns.

Summary of Chapter Three

The discussion of the results which have been presented in Chapter Three is to be found at the end of Chapter Four. At that point, additional analyses of the data from the sixth, fourth, and second grade are available and the data base is also extended to include data from the seventh and eighth grade projects previously carried out at Minnesota.

CHAPTER FOUR

PREDICTING PUPIL ACHIEVEMENT AND ATTITUDES FROM CLASSROOM INTERACTION VARIABLES AT FIVE GRADE LEVELS

Overview

Progress in predicting educational outcomes from a wide variety of predictor variables was so poor, from 1900 to 1952, that after reviewing relevant research, Morsh and Wilder (1954, p. 4) reached the conclusion--"no teaching act has been shown to be consistently (and) significantly related to pupil learning."

During the decades of the 1950s and 1960s some progress in predicting educational outcomes has been made. In this chapter, fairly high multiple correlations are shown to exist between interaction analysis variables and educational outcomes such as pupil achievement adjusted for initial ability and positive pupil attitudes toward the teacher, schoolwork, and learning. A pool of 27 interaction predictor variables was used in a first analysis and a pool of 10 in a second analysis; a computer program[1] selected the most powerful set of predictors from the pool, assigned beta weights in a regression equation such that each equation was unique to each grade level. In a third analysis, a fixed equation was applied to the data from each grade level.

The Problem

It ought to be possible to show that educational outcomes are related to the interaction between the pupils and the teacher. Such a relationship almost seems self-evident; for example, pupils ought to learn more modern math when it is the topic of classroom interaction than they learn when it is not discussed. Much more interesting and less self-evident is whether one pattern of classroom interaction will influence what is learned more than another pattern or perhaps influence how much the pupils like learning when the classes are at the same grade level, the instructional materials are identical or at least very similar and are used for the same period of time, and when the initial ability of the pupils is properly controlled.

Yes, relationships between interaction and outcome ought to exist, but it is very difficult to collect the data and produce the evidence. First, it takes a long time to gather the data because our present, unimaginative designs use one full class as the unit of sampling. Second, tests which measure achievement may be unrelated or, at best, only partially related to the teaching objectives. A test of vocabulary, for example, may include words which are not discussed or used in the classroom. Third, procedures for coding classroom interaction should be consistent from one classroom to the next, from one year to the next, even when the personnel of the research staff is changing. Finally, it is almost impossible to establish the very high standards of experimental control that this problem area requires.

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[1] This computer program was adapted to the University of Michigan computer system by Franklin H. Westervelt.

The Sample

The data for this analysis comes from the second, fourth, and sixth grade self-contained classes discussed in earlier chapters. In addition, data are included from seventh grade two-hour, core classes combining English and social studies and from single hour, eighth grade classes in mathematics. Table 4-1 shows the number of teacher-class units involved. A brief comment about each grade level follows.

TABLE 4-1

NUMBER OF CLASSES IN THE SAMPLE

	Grade Level				
	2nd	4th	6th	7th	8th
Target Population	--	77	200	63	85
Representative Sample	--	--	101	50	50
Administered Pupil Attitude	--	72	101	37	38
Sub-sample for Observation	15	16	30	15	16

Second Grade

The cooperating classes were selected by negotiation with school administrators and teachers and cannot be said to be representative of a parent population. Three school districts were involved and teacher-class units selected on the basis of willingness to cooperate. It was possible to obtain classes in contrasting socio-economic districts.

Fourth Grade

The original seventy-two classes were all the self-contained fourth grade classrooms in a single suburban school district. Five additional classes not included were experimenting with team teaching. The classes in the subsample were chosen to be representative in terms of the class average on the pupil attitude inventory.

Sixth Grade

The 101 participating classes were selected from nine school districts. There were more than 200 sixth grade classes in these districts. The 101 classes were selected to ensure high, medium, and low socioeconomic school communities, to avoid prior commitments to other research projects, and to take into account the teacher's willingness to volunteer. The thirty in the sub-sample were selected to represent the range and average scores of the 101 classes based on the pupil attitude inventory.

Seventh Grade

At the time of this Minnesota study there were sixty-three core classes at the seventh grade level in the urban school districts of St. Paul and Minneapolis, Minnesota. The sample of fifty were selected by stratified random sampling methods to be as representative as possible. Thirteen teachers preferred not to participate for a variety of reasons. The sub-sample was representative of pupil attitude class averages among thirty-seven cooperating classes.

Eighth Grade

The procedure of this project was identical to that of the seventh grade. Twelve teachers preferred not to cooperate.

General Comments about the Samples

The reader should note that random sampling procedures were not used in selecting the classes. Random sampling is a poor way to secure a representative sample when the number of units is small and any selected teacher may choose not to participate. Given a small population, purposive or judgment selection of a small sample generally provides a superior sample of the population.

The best sample was probably in the eighth grade math classes, even though twelve teachers withdrew from participation. It was best not because it was the most representative sample of a population of classes, but because it was representative of a wide range of teaching behavior. On the other hand, the fourth grade teachers were forced to participate whether they liked the project or not. The coercion was an integral part of the sampling procedure. Yet the teaching behavior was rather narrow in range, suggesting the hypothesis that teachers are careful to "put on a conservative act" when forced to participate.

There was a fair amount of evidence to suggest that the least competent teachers were most likely not to be in the sample. If the sample is biased, it is likely that the most insecure, the frightened, and the most suspicious found ways to avoid participating.

Twenty-Seven Interaction Analysis Variables

Source of Variables

Flanders' Interaction Analysis Categories (FIAC) were used to code the classroom interaction, shown in Table 4-2. Trained observers categorized the verbal behavior taking place during a time interval which was approximately three seconds in length. The coded sequence was entered into a ten by ten matrix by pairing each code with its preceding code. The two numbers designate a cell into which the frequency of that pair is tallied. W. D. Coats (1966) selected twenty-seven interaction analysis (IA) variables from the matrix. The operational definitions of the twenty-seven IA variables are listed in Table 4-3.

Table 4-4 reports the means and standard deviations of 27 IA variables for each grade. The eighth grade teachers lectured more than any other grade level. These mathematics teachers were teaching a unit on geometry. The high percentage of lecturing is not unexpected. All variables which are related to lecturing are affected by its magnitude. For example, teacher talk which contains lecturing is larger in the eighth grade than it is in the other grades. The mean of sustained acceptance in the second grade is about one-half the value for the other grades. Again the related variables are affected by the magnitude of this variable. With the two exceptions just noted above, the means and standard deviations of the IA variables are quite consistent across grades.

Factor Analyses

The varimax solutions for the five grades are fairly similar, but the second grade solution differs the most from the others. The factor loadings for each grade level are shown in Tables 4-5 to 4-9. The variables that load high on the first factor deal with feedback, mostly from the teacher to the pupils. This factor might be called *positive and negative teacher reactions*, it could also be called *indirect and direct teacher influence*. The second factor could be called *content* since it seems to involve lecturing, the content cross, and teacher directions. The third factor might be called *questioning* or *eliciting* since teacher questions play such a prominent part. The fourth factor emphasizes teacher *directions* and *criticism* which might refer to teacher directions which have less to do with content and more to do with discipline.

Grades two, four, and six seem to have four fairly strong factors, each accounting for fifteen percent or more of the variance. Grades seven and eight have only three fairly strong factors, each accounting for twenty

TABLE 4-2

CATEGORIES FOR INTERACTION ANALYSIS

TEACHER TALK	RESPONSE	1.*	ACCEPTS FEELING: accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting or recalling feelings are included.
		2.*	PRAISES OR ENCOURAGES: praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying, "um hm?" or "go on" are included.
		3.*	ACCEPTS OR USES IDEAS OF STUDENT: clarifying, building, or developing ideas suggested by a student. As a teacher brings more of his own ideas into play, shift to category five.
		4.*	ASKS QUESTIONS: asking a question using the teacher's ideas about content or procedure with the intent that a student answer.
	INITIATION	5.*	LECTURING: giving facts or opinions about content or procedure; expressing his own ideas, asking rhetorical questions.
		6.*	GIVING DIRECTIONS: directions, commands, or orders to which a student is expected to comply.
		7.*	CRITICIZING OR JUSTIFYING AUTHORITY: statements intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing; extreme self-reference.
STUDENT TALK	RESPONSE	8.*	STUDENT TALK--RESPONSE: a student makes a predictable response to teacher. Teacher initiates the contact or solicits student statement and sets limits to what the student says.
	INITIATION	9.*	STUDENT TALK--INITIATION: talk by students which they initiate. Unpredictable statements in response to teacher. Shift from 8 to 9 as student introduces own ideas.
		10.*	SILENCE OR CONFUSION: pauses, short period of silence and periods of confusion in which communication cannot be understood by the observer.

*There is NO scale implied by these numbers. Each number is classificatory, it designates a particular kind of communication event. To write these numbers down during observation is to enumerate, not to judge a position on a scale.

TABLE 4-3

DEFINITIONS OF THE INDEPENDENT VARIABLES

Name	Definition
i/d ratio	Ratio of the number of tallies in columns 1-3 of a 10 by 10 matrix to the number of tallies in columns 6 and 7 (in Figure 4-1, the A to B ratio of column totals.)
i/(i+d) ratio	Ratio of the number of tallies in columns 1-3 to the number of tallies in columns 1-3, 6, and 7 (ratio of A to A + B in Figure 4-1).
I/D ratio	Ratio of the number of tallies in columns 1-4 to the number in 5-7 (ratio of C to D of Figure 4-1).
I/(I+D) ratio	Ratio of the number of tallies in columns 1-4 to the number in 1-7 (ratio of C to C + D of Figure 4-1).
Expansive Activity	Percentage of tallies in columns 1-3 (see A of Figure 4-1).
Restrictive Activity	Percentage of tallies of columns 6 and 7 (see B of Figure 4-1).
Indirect Activity	Percentage of tallies in columns 1-4 (see C of Figure 4-1).
Direct Activity	Percentage of tallies in columns 5-7 (see D of Figure 4-1).
Teacher Talk	Percentage of tallies in columns 1-7 (see C + D of Figure 4-1).
Directed Student Response	Percentage of tallies in column 8 (see E of Figure 4-1).
Student Initiated Response	Percentage of tallies in column 9 (see F of Figure 4-1).
Student Talk	Percentage of tallies in columns 8 and 9 (see G of Figure 4-1).
Small Vicious Circle	Percentage of tallies in the (6-7) and the (7-6) cells (areas I + K in Figure 4-1).
Big Vicious Circle	Percentage of tallies in the (6-6), (6-7) (7-6), and (7-7) cells (areas H, I, J, and K of Figure 4-1).

TABLE 4-3--Continued

Name	Definition
Rebellion	Percentage of tallies in the (6-9) and (7-9) cells (area L of Figure 4-1).
Teacher Questions	Percentage of tallies in column 4 (see O, Figure 4-2).
Teacher Lecture	Percentage of tallies in column 5 (see P, Figure 4-1).
Content	Percentage of tallies in columns 4 and 5 (see O + P, of Figure 4-2).
Content Cross	Percentage of tallies in columns 4 and 5 plus the percentage in the (4-1), (4-2), (4-3), (4-6), (4-7), (4-8), (4-9), (4-10), (5-1), (5-2), (5-3), (5-6), (5-7), (5-8), (5-9), and (5-10) cells (area M of Figure 4-1).
Drill	Percentage of tallies in the (4-8) and (8-4) cells (areas Q + R of Figure 4-2).
Lecture plus Drill	Percentage of tallies in column 5 plus the percentage in the (4-8) and (8-4) cells (column P, areas Q and R in Figure 4-2).
Sustained Acceptance	Percentage of tallies in the (3-3) cell (area S of Figure 4-2).
Sustained Expansive Activity	Percentage of tallies in the (1-1), (1-2), (1-3), (2-1), (2-2), (2-3), (3-1), (3-2), and (3-3) cells (area N of Figure 4-1).
Praise	Percentage of tallies in column 2 (see T of Figure 4-2).
Reward	Percentage of tallies in the (8-1), (8-2), (8-3), (9-1), (9-2), and (9-3) cells (area U of Figure 4-2).
Restrictive Feedback	Percentage of tallies in the (8-6), (8-7), (9-6), and (9-7) cells (area V of Figure 4-2).
Flexibility	The arithmetic difference between the largest i/d ratio over all time-use categories (e.g., discussion, administrative routine, new material, etc.) and the smallest i/d ratio for all time-use categories.

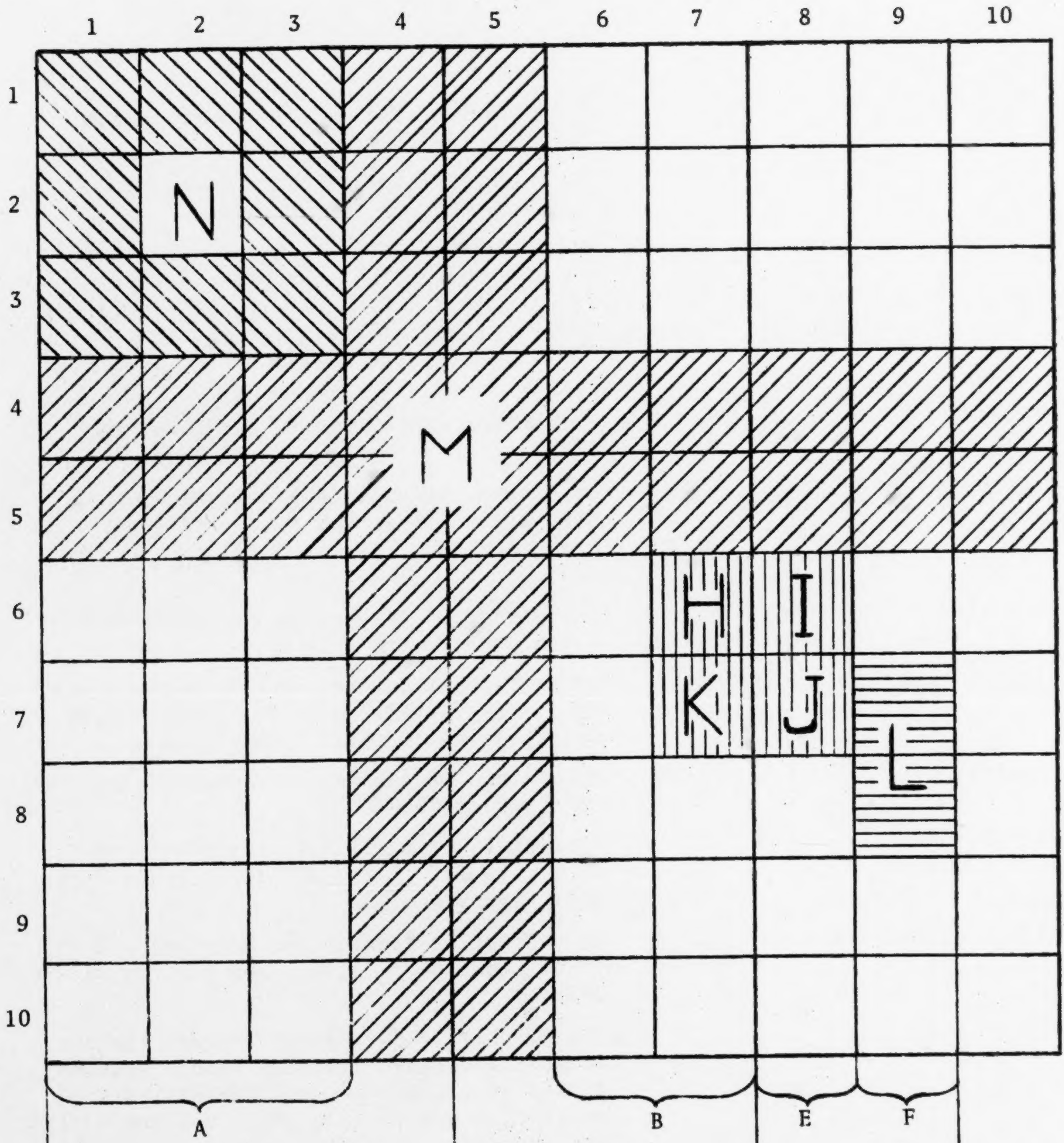
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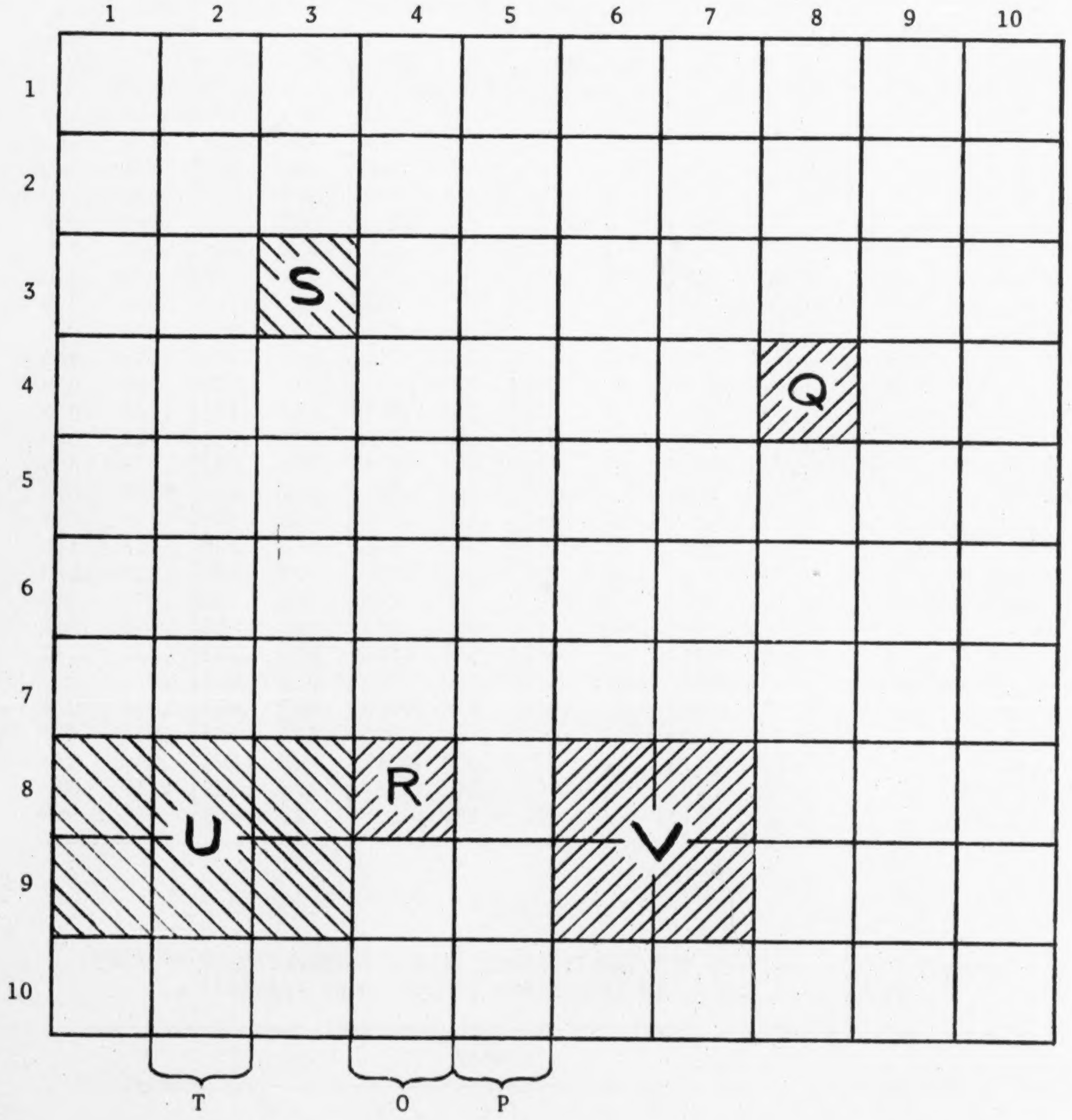
Figure 4-1.--Diagram of a 10 x 10 Matrix.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P

Figure 4-2.--Diagram of a 10 x 10 Matrix.

TABLE 4-4

MEANS AND STANDARD DEVIATIONS OF INTERACTION ANALYSIS VARIABLES

Variable	2nd Grade		4th Grade		6th Grade		7th Grade		8th Grade	
	M	SD	M	SD	M	SD	M	SD	M	SD
i/d Ratio	.428	.118	1.186	.601	1.263	.725	.993	.970	1.402	1.542
i/i+d Ratio	.295	.063	.507	.143	.519	.136	.399	.232	.437	.265
I/D Ratio	.483	.172	.540	.262	.564	.199	.483	.246	.387	.249
I/I+D Ratio	.317	.078	.335	.101	.350	.083	.308	.119	.259	.119
Expansive Act. (i)	.054	.014	.077	.033	.081	.024	.067	.036	.067	.039
Restrictive Act. (d)	.129	.026	.075	.032	.077	.030	.115	.066	.098	.070
Indirect Act. (I)	.165	.036	.176	.054	.183	.046	.179	.070	.178	.079
Direct Act. (D)	.364	.079	.356	.091	.346	.088	.412	.113	.516	.119
Teacher Talk (I+D)	.529	.073	.533	.079	.530	.093	.591	.098	.694	.096
Dir. Stud. Resp.	.215	.034	.187	.069	.209	.096	.191	.100	.119	.063
Stud. Init. Resp.	.065	.022	.100	.038	.110	.048	.091	.034	.067	.039
Student Talk	.280	.036	.286	.066	.319	.093	.082	.101	.187	.075
Small Vicious Circle	.004	.003	.003	.003	.003	.003	.006	.005	.006	.010
Big Vicious Circle	.044	.014	.032	.017	.033	.019	.053	.042	.038	.039
Rebellion	.006	.003	.004	.007	.006	.005	.008	.006	.008	.011
Teacher Questions	.112	.037	.100	.044	.102	.029	.111	.049	.111	.054
Teacher Lecture	.235	.078	.281	.103	.270	.085	.297	.125	.418	.146
Content	.346	.075	.381	.101	.372	.090	.408	.107	.529	.143
Content Cross	.505	.086	.508	.100	.511	.098	.540	.100	.670	.140
Drill	.079	.026	.062	.030	.075	.024	.081	.038	.095	.065
Lecture + Drill	.313	.071	.344	.096	.344	.087	.078	.108	.513	.132
Sust. Acceptance	.007	.003	.014	.010	.014	.007	.013	.013	.015	.016
Sust. Exp. Act.	.016	.005	.021	.015	.018	.009	.017	.015	.020	.018
Praise	.018	.009	.017	.011	.009	.005	.013	.008	.014	.008
Reward	.035	.017	.049	.017	.054	.015	.045	.023	.040	.023
Rest. Feedback	.020	.008	.011	.006	.012	.007	.018	.131	.119	.015
Flexibility	.562	.257	1.812	1.411	4.881	4.557	3.584	4.067	2.896	2.959

TABLE 4-5

VARIMAX FACTOR LOADINGS FOR TWENTY-SEVEN VERBAL INTERACTION VARIABLES WHICH WERE COLLECTED IN FIFTEEN SECOND-GRADE CLASSES

Variable	Factor					Communality
	I	II	III	IV	V	
i/d Ratio	.82	.02	.13	.15	-.49	.95
i/i+d Ratio	.84	-.07	.14	.13	-.48	.98
I/D Ratio	.12	.12	.93	-.27	-.12	.99
I/I+D	.08	.20	.89	-.35	-.21	1.00
Expansive Activity	.22	-.21	.31	-.74	-.40	.90

TABLE 4-5--Continued

Variable	Factor					Communality
	I	II	III	IV	V	
Restrictive Activity	-.41	-.18	.14	-.87	.11	.99
Indirect Activity	.09	-.21	.87	-.39	-.15	.98
Direct Activity	-.06	-.76	-.49	.32	.14	.94
Teacher Talk	.00	-.94	.12	.04	.03	.89
Dir. Student Response	-.27	.80	.05	.37	.13	.88
Stu. Initiated Resp.	.48	-.10	.04	-.61	-.27	.69
Student Talk	-.01	.91	.08	.06	-.01	.84
Small Vicious Circle	-.28	-.29	.07	-.87	.17	.96
Big Vicious Circle	-.83	.01	.09	-.18	-.04	.74
Rebellion	-.08	-.19	-.01	-.94	.17	.95
Teacher Questions	-.11	-.06	.91	.24	.22	.95
Teacher Lecture	.16	-.51	-.46	.70	.05	.99
Content	.12	-.55	-.11	.81	.14	1.00
Content Cross	.11	-.53	.03	.81	.23	1.00
Drill	-.36	.18	.71	.44	.27	.94
Lecture plus Drill	.05	-.47	-.26	.83	.12	.99
Sustained Acceptance	.28	-.08	.01	.00	-.94	.97
Sust. Expansive Act.	.24	-.04	.02	-.11	-.96	.99
Praise	-.11	.46	-.04	.06	-.75	.80
Reward	.14	.26	.55	-.09	-.64	.80
Restrictive Feedback	-.75	.54	-.00	-.20	.11	.90
Flexibility	.75	.02	-.12	.19	-.00	.61
Eigenvalue	4.18	4.91	4.79	6.83	3.89	24.60
Percent of Variance	15.5 %	18.2 %	17.7 %	25.3 %	14.4 %	91.1 %

TABLE 4-6

VARIMAX FACTOR LOADINGS FOR TWENTY-SEVEN VERBAL INTERACTION VARIABLES WHICH WERE COLLECTED IN SIXTEEN FOURTH-GRADE CLASSES

Variable	Factor					Communality
	I	II	III	IV	V	
i/d Ratio	.60	-.04	.11	-.72	-.22	.94
i/i+d Ratio	.60	.03	.11	-.74	-.23	.97
I/D Ratio	.27	-.30	.90	-.11	.01	.98
I/I+D Ratio	.36	-.40	.84	-.05	.04	1.00
Expansive Activity	.92	-.22	.26	-.11	-.05	.98
Restrictive Activity	-.00	-.29	.06	.95	-.01	.98
Indirect Activity	.36	-.02	.92	-.05	-.03	.99
Direct Activity	-.17	.86	-.45	.04	.05	.98
Teacher Talk	.05	.97	.11	.01	.03	.95

TABLE 4-6--Continued

Variable	Factor					Communality
	I	II	III	IV	V	
Dir. Student Response	-.35	-.68	.14	.12	.49	.85
Stu. Initiated Resp.	.55	-.24	-.07	-.38	-.32	.62
Student Talk	-.05	-.86	.10	-.10	.30	.85
Small Vicious Circle	-.12	-.10	-.10	.89	-.21	.87
Big Vicious Circle	-.06	-.02	.11	.92	-.06	.87
Rebellion	.07	-.40	-.26	.54	-.43	.71
Teacher Questions	-.24	.13	.94	.02	.01	.97
Teacher Lecture	-.15	.85	-.42	-.26	.05	.98
Content	-.26	.93	-.01	-.26	.05	.99
Content Cross	-.34	.89	.13	-.27	.05	1.00
Drill	-.37	-.01	.86	.24	.11	.95
Lecture plus Drill	-.27	.91	-.18	-.21	.09	.98
Sustained Acceptance	.96	.01	-.01	-.17	-.08	.96
Sust. Expansive Act.	.97	-.07	-.02	-.14	.02	.97
Praise	.76	-.45	-.03	.09	.30	.89
Reward	.72	-.35	.50	-.04	-.10	.90
Restrictive Feedback	-.22	-.56	.02	.77	.11	.96
Flexibility	-.01	.06	-.14	-.68	-.30	.58
Eigenvalue	5.87	7.34	4.93	5.51	1.02	24.66
Percent of Variance	21.7 %	27.2 %	18.3 %	20.4 %	3.8 %	91.3 %

TABLE 4-7

VARIMAX FACTOR LOADINGS FOR TWENTY-SEVEN VERBAL INTERACTION VARIABLES WHICH WERE COLLECTED IN THIRTY SIXTH-GRADE CLASSES

Variable	Factor						Communality
	I	II	III	IV	V	VI	
i/d Ratio	.70	-.09	.08	.54	.10	-.16	.92
i/i+d Ratio	.74	-.08	.17	.62	.13	.02	.98
I/D Ratio	.45	.52	.67	.17	.17	.02	.99
I/I+D Ratio	.46	.52	.66	.24	.16	.04	1.00
Expansive Activity	.92	-.07	.24	.08	.18	.08	.95
Restrictive Activity	-.30	.00	-.12	-.93	-.06	-.04	.97
Indirect Activity	.64	-.13	.68	.13	.22	.09	.96
Direct Activity	-.10	-.94	-.22	-.19	-.04	-.00	.97
Teacher Talk	.22	-.95	.13	-.11	.07	.04	.98
Dir. Student Response	-.26	.66	.34	.27	-.23	-.32	.84
Stud. Initiated Resp.	.17	.18	-.65	.14	.24	.06	.57
Student Talk	-.17	.77	-.04	.37	-.08	-.29	.86
Small Vicious Circle	-.23	.12	-.34	-.80	-.02	-.31	.92

TABLE 4-7--Continued

Variable	Factor						Communality
	I	II	III	IV	V	VI	
Big Vicious Circle	-.12	-.01	-.12	-.92	-.11	.13	.91
Rebellion	-.28	.13	-.59	-.51	.02	-.32	.81
Teacher Questions	.25	-.15	.87	.14	.19	.07	.90
Teacher Lecture	.00	-.97	-.18	.14	-.02	.01	.99
Content	.08	-.97	.12	.18	.04	.04	.99
Content Cross	.09	-.94	.25	.19	.02	-.01	.99
Drill	.00	-.02	.81	.36	.01	-.19	.82
Lecture plus Drill	-.00	-.96	.05	.24	-.02	-.05	.99
Sustained Acceptance	.79	-.13	-.07	.29	.08	.39	.88
Sust. Expansive Act.	.76	-.10	-.03	.22	.33	.41	.91
Praise	.25	.03	.27	.07	.78	.08	.75
Reward	.87	-.01	.32	.02	-.08	-.21	.90
Restrictive Feedback	-.45	.42	-.24	-.39	.04	-.41	.75
Flexibility	.34	-.16	-.11	.28	.68	-.06	.70
Eigenvalue	5.62	7.38	4.30	4.33	1.53	1.04	24.20
Percent of Variance	20.8 %	27.3 %	15.9 %	16.0 %	5.7 %	3.9 %	89.6 %

TABLE 4-8

VARIMAX FACTOR LOADINGS FOR TWENTY-SEVEN VERBAL INTERACTION VARIABLES WHICH WERE COLLECTED IN FIFTEEN SEVENTH-GRADE CLASSES

Variable	Factor					Communality
	I	II	III	IV	V	
i/d Ratio	.82	.44	-.05	.21	-.04	.92
i/i+d Ratio	.87	.31	-.21	.26	.02	.97
I/D Ratio	.25	-.27	-.91	.17	-.06	.99
I/I+D Ratio	.30	-.30	-.89	.15	-.00	1.00
Expansive Activity	.67	.33	-.41	.50	-.10	.98
Restrictive Activity	-.93	-.09	.16	-.02	-.25	.97
Indirect Activity	.36	.09	-.90	.19	-.05	.98
Direct Activity	-.05	.77	.60	-.02	-.04	.96
Teacher Talk	.20	.95	.06	.11	-.08	.96
Dir. Student Response	.06	-.80	-.15	-.29	.37	.88
Stud. Initiated Resp.	-.01	-.16	-.10	.66	.10	.48
Student Talk	.05	-.85	-.17	.02	.44	.94
Small Vicious Circle	.86	-.06	.19	.02	-.23	.84
Big Vicious Circle	-.77	.01	.29	-.10	-.48	.92
Rebellion	-.90	-.05	.25	.18	.00	.91
Teacher Questions	.02	-.11	-.97	-.09	.01	.97
Teacher Lecture	.45	.75	.47	-.01	.10	.99

TABLE 4-8--Continued

Variable	Factor					Communality
	I	II	III	IV	V	
Content	.53	.83	.09	-.06	.12	1.00
Content Cross	.40	.85	-.19	.00	.21	.97
Drill	-.10	-.20	-.89	-.07	.35	.96
Lecture Plus Drill	.49	.81	.23	-.04	.25	1.00
Sustained Acceptance	.88	.31	.00	.21	-.13	.94
Sust. Expansive Act.	.86	.32	-.10	.21	-.14	.92
Praise	-.34	.31	-.60	.04	.13	.59
Reward	.51	.26	-.53	.62	-.05	1.00
Restrictive Feedback	-.86	-.16	-.11	.12	.24	.86
Flexibility	.76	.03	.04	-.11	.02	.59
Eigenvalue	9.35	6.52	5.99	1.54	1.08	24.48
Percent of Variance	34.6 %	24.1 %	22.2 %	5.7 %	4.0 %	90.6 %

TABLE 4-9

VARIMAX FACTOR LOADINGS FOR TWENTY-SEVEN VERBAL INTERACTION VARIABLES WHICH WERE COLLECTED IN SIXTEEN EIGHTH-GRADE CLASSES

Variable	Factor					Communality
	I	II	III	IV	V	
i/d Ratio	-.87	.31	-.13	.06	.14	.89
i/i+d Ratio	-.84	.37	-.26	.04	-.09	.93
I/D Ratio	-.37	-.11	-.89	.09	-.15	.98
I/I+D Ratio	-.41	-.09	-.89	.13	-.15	1.00
Expansive Activity	-.86	-.02	-.36	.01	-.32	.97
Restrictive Activity	.50	-.71	.21	-.42	.03	.97
Indirect Activity	-.51	.14	-.83	.03	-.12	.99
Direct Activity	.17	.66	.68	-.21	.07	.97
Teacher Talk	-.20	.93	.17	-.24	-.02	.98
Dir. Student Response	.23	-.25	-.68	.56	.03	.89
Stu. Initiated Resp.	-.11	-.83	.18	.12	.10	.76
Student Talk	.13	-.65	-.47	.53	.08	.94
Small Vicious Circle	.23	-.63	.25	-.66	.18	.98
Big Vicious Circle	.38	-.60	.34	-.58	.08	.96
Rebellion	.24	-.78	.16	-.43	.21	.92
Teacher Questions	-.12	.21	-.94	.06	.04	.95
Teacher Lecture	-.10	.88	.46	.02	.04	.99
Content	-.15	.98	.11	.04	.07	1.00
Content Cross	-.03	.96	-.20	.11	.03	.98
Drill	.16	.02	-.93	.12	-.00	.90
Lecture Plus Drill	-.03	.98	.04	.09	.05	.97

TABLE 4-9--Continued

Variable	Factor					Communality
	I	II	III	IV	V	
Sustained Acceptance	-.95	.08	.03	.07	.11	.93
Sust. Expansive Act.	-.97	.12	-.02	.05	-.05	.95
Praise	-.37	.03	-.39	.19	-.63	.73
Reward	-.66	-.16	-.55	.02	-.42	.94
Restrictive Feedback	.51	-.81	-.01	-.12	-.03	.93
Flexibility	-.88	.19	-.21	.02	-.19	.89
Eigenvalue	6.95	8.98	6.45	1.97	.94	25.30
Percent of Variance	25.7 %	33.3 %	23.9 %	7.3 %	3.5 %	93.7 %

percent or more of the variance. There are a few rules about reading Tables 4-5 through 4-9 to keep in mind. Don't be misled by a negative sign, or the lack of it, before a particular factor loading number. The positive and negative association with either pupil achievement or pupil attitude measures are not indicated by the algebraic signs of factor loadings. For example, consider the sign before the i/d ratio, the top item on each Table for Factor I. A negative sign for this variable appears only in Table 4-9, eighth grade mathematics. This negative sign (in Table 4-9) is an artifact of the computer program. However, it is always true that this variable has an inverse relationship with certain other variables like the two which have "vicious circle" in their titles. The inverse relationship indicated is not an artifact. In other words, once the computer chooses an algebraic sign, it is consistent for the rest of the column.

Criterion Variables

The instruments and the scoring procedures used to quantify two outcomes of learning, namely class achievement and attitudes toward the teacher and class are described below and summarized in Table 4-10.

Second Grade

Achievement:--Three tests of the Stanford Achievement Test were used; Paragraph Meaning, Word Study Skills, and Arithmetic Problem Solving. Only the first three parts of the Word Study Skills were used.

Items were weighted by their ability to discriminate the upper third of the pretest respondents from the lower third. Weights varied from one to four. Both pretest and posttest subtest t-scores were computed by using the pretest mean and standard deviation. Each student's achievement score is the mean of the three subtest scores.

TABLE 4-10

INSTRUMENTS TO MEASURE CRITERION VARIABLES

Achievement (pretest and posttest):

2nd grade[a]--Stanford Achievement Test, Primary Battery I
4th grade[b]--Test on New Zealand
6th grade[a]--Metropolitan Achievement Tests, Form Bm
7th grade[b]--Test on New Zealand
8th grade[b]--Mathematics Test (Geometry)

Attitude:

2nd grade[b]--Six items from Michigan Student Questionnaire
4th grade[b]--Modified Michigan Student Questionnaire
6th grade[b]--Michigan Student Questionnaire
7th grade[b]--Minnesota Student Attitude Inventory, long form
8th grade[b]--Minnesota Student Attitude Inventory, long form

[a] Nationally published tests.

[b] Tests developed for this project

Attitude:--Five items from the Michigan Student Questionnaire were selected for use in the second grade. The items were reworded at 2nd grade vocabulary level. Each item had a favorable and unfavorable response. The favorable response was scored one and the unfavorable as zero. Therefore, a student could score from zero to five.

Fourth Grade

Achievement:--Fifty items were developed to determine the students' mastery of a unit on New Zealand. The items were scored plus one for the correct answer, zero for "don't know", and minus one for the wrong answer.

Attitude:--Thirty-one items were selected from the Michigan Student Questionnaire to be administered in the fourth grade. Each item was scored one to four, with four being the most positive response. Therefore, a student could score from 31 to 124.

Sixth Grade

Achievement:--Seven subtests of the Metropolitan Achievement Test were administered. The subtests included: Usage, Parts of Speech, Punctuation and Capitalization, Language Study Skills, Social Studies, Computation, and Problem Solving Concepts. The results of each test were converted to a standard score, percentile rank, by using the Tables provided in the Test Manual. A single score for each student was computed by averaging the mean of the first three tests and the means of the last two pairs.

Attitude:--The Michigan Student Questionnaire was administered to each class. Each of the fifty-three items was scored one to four, with four being the most positive response. Therefore, a student could score from 53 to 212.

Seventh Grade

Achievement:--The Test on New Zealand consisted of sixty items designed to evaluate a student's mastery of the unit. Each item correct was scored as one. Therefore, a student could score from zero to sixty.

Attitude:--Each of the sixty-eight items from the Minnesota Student Attitude Inventory was scored one to four, with four being the most positive response. Therefore, each student could score from 68 to 272.

Eighth Grade

Achievement:--A sixty-two item instrument was devised to measure the student's mastery of a unit on geometry which also contained some algebra. Each item which was correct was scored one. Therefore, a student could score from zero to 62.

Attitude:--Each of the sixty-eight items from the Minnesota Student Attitude Inventory was scored one to four, with four being the most positive response. Therefore, a student could score zero to 60.

Adjusted Achievement Scores

An adjusted achievement score was computed for each student in the second, fourth and sixth grade sample. All pretest and posttest scores for a single grade were submitted to a computer program[1] which

(1) computed the partial regression coefficient,
(2) adjusted each student's posttest score, and
(3) computed adjusted achievement means for each class.

---

[1] Written by Larry R. Gess.

$$b_{\text{pre-post}} = r_{\text{pre-post}} \left(\frac{Sd_{\text{post}}}{Sd_{\text{pre}}} \right)$$

$$X \text{ adjusted} = X_{\text{post}} - b_{\text{pre-post}} \left(X_{\text{pre}} - \bar{X}_{\text{pre}} \right)$$

where b = partial regression coefficient
r = correlation between pre and post
Sd = standard deviation
X = individual students' scores
and $\bar{X}$ = grand mean

Essentially the statistical procedure removes from the posttest score the variation which is attributable to the student's ability at first testing. The adjusting procedure is a modified simple regression. Therefore, to be more precise, the average variance attributable to the pretest is removed from the posttest.

The individual pretest and posttest scores for seventh and eighth grade achievement were not readily available. Therefore, the adjusting procedure was computed by using pretest and posttest class achievement means. The correlation between pretest and posttest means was probably higher than the correlation between pretest and posttest scores of individuals. Thus, the variation of adjusted class means probably is smaller than class means of adjusted scores. If this is actually the case, the regression equations would be more difficult to generate for adjusted means.

In Table 4-11, it can be seen that the variance of the adjusted scores is less than the variance of posttest scores and the variance of class means of adjusted scores is less than class means of posttest scores. The variance of pretest and posttest scores are approximately equal when the same instrument is used for both testings. Thus, the partial regression coefficient, whose magnitude contributes the most to reducing the variance of adjusted scores, is influenced largely by the magnitude of the correlation between the pretest and posttest. The variance was reduced by the adjusting procedure to a greater degree in the second and sixth grades. In these two grades standardized tests were used. The high correlation indicates that using standardized achievement tests to measure effects of instruction is rather ineffective as there was very little variation in the change between testings.

The Procedure of Forward Linear Stepwise Multiple Regression Analysis

Before attempting to analyze associations which might exist between either achievement adjusted for initial ability or attitude--on the one hand, and some IA variable--on the other, an explanation of our stepwise, linear, regression analysis is due the reader.

TABLE 4-11

MEANS AND STANDARD DEVIATIONS OF THE CRITERION VARIABLES

Grade Level	Achievement						Attitude	
	Pre		Post		Adjusted			
	M	Sd	M	Sd	M	Sd	M	Sd
2nd	49.8	5.23	54.8	5.06	55.0	1.33	5.17	.524
4th	11.1	2.96	21.3	4.03	21.4	3.03	96.6	11.4
6th	49.9	5.71	54.1	6.96	54.5	1.92	170.0	18.5
7th	25.5	2.25	34.7	3.92	34.7	2.31	237.6	25.8
8th	20.5	4.74	27.0	6.09	27.0	2.41	243.8	22.0

The objective of this kind of regression analysis is to generate equations to predict the value of a criterion variable from one or more predictor variables.

$$Y' = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_k X_k$$

where β_0 = a constant

$X_1, X_2, X_3, \dots, X_k$ = predictor variables

$\beta_1, \beta_2, \beta_3, \dots, \beta_k$ = optimum weights of the predictor variables

The predictor variables which are placed into the regression equation are selected from a pool which contains all variables to be considered for inclusion. When forward stepwise regression analysis is used, the equations are generated step-by-step, usually increasing the number of variables in the equation by one on each step. Ideally the equation for the nth step will contain the n variables which, when optimally weighted, predict the criterion variable better than any other combination of n variables from the variable pool.

The least sum of squares criterion is used to determine which predictor variables and their respective optimum weights are to be used in an equation. The least sum of squares is computed by squaring the difference between the predicted value and its actual value and summing across all cases. Therefore, the combination of variables and weights that are selected for any equation must give the smallest sum of squared differences, that is, the least sum of squares.

The stepwise regression program used in this study does not always generate the ideal equation. The programming complexities and, therefore, the execution time necessary for an ideal solution are prohibitive. The equation for the first step selects the predictor variable which correlates highest with the criterion variable because this variable, when optimally weighted and combined with a second variable, is more likely to produce the least sum of squares.

In order to illustrate how the program works, the first few steps of a particular stepwise regression will be discussed. In this case, seventh grade social studies achievement, adjusted for pretest scores, serves as the outcome criterion. Small vicious circle was selected as the first step in the analysis as it correlated highest, -.620, with adjusted achievement. These steps are outlined in Table 4-12. After the first step, the equation may not be optimal because the best pair of all possible pairs is not necessarily selected. The amount of time necessary to compute the sum of squares for every optimally weighted pair of predictor variables from the variable pool would be very costly and the programming problems would be immense. The magnitude of the problem increases as the combinations of three and four variables are considered for the equation. Therefore, the Michigan stepwise regression program does not consider all possible combinations. Generally the program uses the strategy of adding the variable to the already selected variables which will result in the least sum of squares for the optimally weighted equation.

TABLE 4-12

STEPWISE LINEAR MULTIPLE REGRESSION OF SEVENTH-GRADE ADJUSTED ACHIEVEMENT USING A POOL OF TWENTY-SEVEN INTERACTION ANALYSIS VARIABLES

Step	Variable	Biased		Unbiased		
		R	SE of Y	R'	$(R')^2$	SE of Y'
1	Small Vicious Circle	.6199	1.810	.5804	.3369	1.879
2	Rebellion	.6585	1.736	.5824	.3393	1.876
3	Restrictive Activity (d)	.6937	1.661	.5829	.3398	1.875
4	Restrictive Feedback	.7170	1.608	.5653	.3196	1.903
5	Big Vicious Circle	.8511	1.211	.7557	.5712	1.511
6	Drill	.8713	1.132	.7609	.5785	1.498
7[a]	Small Vicious Circle (Removed)	.8710	1.133	.7903	.6246	1.414
8	Teacher Questions	.8763	1.111	.7706	.5939	1.470
9	Reward	.8933	1.037	.7718	.5958	1.466
10	Flexibility	.9009	1.001	.7486	.5607	1.529
11	Directed Student Resp.	.9151	.930	.7381	.5448	1.556
12	Rebellion (Removed)	.9149	.931	.7872	.6197	1.422

[a] Optimum equation--The equation which produced the maximum unbiased R.

The equation for the second step of seventh grade adjusted achievement analysis contains two predictor variables, rebellion along with small vicious circle which was selected on the first step. The program has restricted the equation to contain the variable which in combination with the variable from the first step would result in the least sum of squares. Conceivably another combination of two variables could give a smaller sum of squares. Thus, the equation for any step other than the first is a good prediction equation, but may not be the optimum equation.

The step-by-step generation of equations may be terminated by one of two methods in the Michigan program, insufficient change in the coefficient of multiple correlation (R) or exhausting the degrees of freedom (df). An F test can be computed to interpret the difference between R at one particular step and the R at the preceding step.

$$F = \frac{\left(R_1^2 - R_2^2\right)\left(N - M_1 - 1\right)}{\left(1 - R_1^2\right)\left(M_1 M_2\right)}$$

where R_1 = multiple R with the larger number of predictor variables

R_2 = multiple R with the smaller number of predictor variables

M_1 = larger number of predictor variables

M_2 = small number of predictor variables

N = number of classes

The value of the F test must be equal to or greater than an F value supplied by the program user or the analysis will terminate. The df is equal to the number of subjects minus one. When the number of predictor variables in the equation equals the number of classes minus one, the df have been exhausted. The Michigan program will terminate when the number of steps equals the number of df. If a predictor variable in an equation is contributing very little to the reduction of the sum of squares on the nth step, the variable is removed. The number of df used should be reduced by one, but the Michigan program, by counting steps instead of the number of predictor variables in the equation, adds one to the number of df used. Therefore, if one or more variables have been removed from the equation, the analysis could be terminated prematurely. A more optimum equation might have been generated if the program had not terminated.

The user of the Michigan program also supplies the F criterion for the removal of a variable. The F test must be less than the indicated value if the variable is to be removed from the equation. The F criterion for withdrawal must be equal to or less than the F criterion for entering a variable. Each succeeding F test would decrease if the "ideal" regression analysis were used, but when using the Michigan program, the value of the F test could suddenly increase if a very good combination of variables were generated. Thus, a user of the Michigan program usually supplies a relatively small F criterion for entering. Therefore, a variable must have almost no effect on the R if it is to be removed. The step seven of the seventh grade adjusted achievement analysis, *small vicious circle* was removed as its removal only reduced the R by .0003. The predictor variable originally selected because it correlated highest with the criterion variable was no longer making a significant contribution to the regression equation.

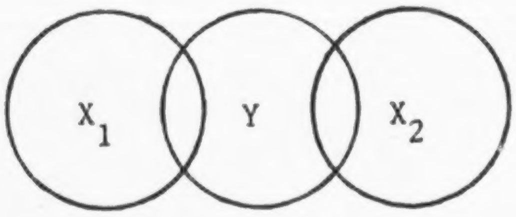
Suppression

A predictor variable can contribute to a regression equation in one of two ways: by its independence of other variables or by suppressing one or more variables. If two predictor variables are independent (r = .0) but they both correlate .4 with the criterion variables, the coefficient of multiple correlation would be .57.

$r_{y1} = .4$

$r_{y2} = .4$

$r_{12} = .0$



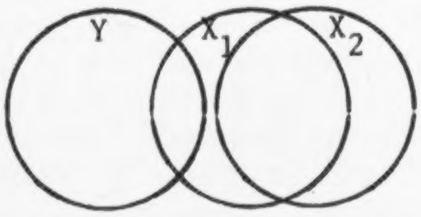
The Venn diagram demonstrates that two variables are accounting for two different sources of variation in the criterion variable.

Suppression effect can be demonstrated by the situation when one predictor variable correlates .4 with the criterion variable and the other predictor variable correlates .0, but the two predictor variables correlate .9.

$r_{y1} = .4$

$r_{y2} = .0$

$r_{12} = .0$



The Venn diagram demonstrates that the second variable accounts for most of the variation of the first variable which is not common with the criterion. Therefore, the remaining variation of the first variable correlates highly.

The Optimum Solution

This computer program will continue to generate a new equation with each step until the change in R is very small or the df exhausted. The last equation generated is not necessarily the best and the researcher must decide which equation represents the most parsimonious analysis of his data. A change in the F test or exhausting the df are not very good criteria for selecting the optimum equation. In this section it is proposed that the optimum equation occurs when the standard error of the unbiased predicted criterion is at a minimum. Just what is meant by *biased* and *unbiased* and what is meant by optimal equation are now discussed.

A multiple correlation analysis generated by a computer program such as the one we used might be spuriously high if an especially fortuitous combination of error variance was exploited. We will call such a regression coefficient *biased* since it is biased in terms of taking advantage of error. If we had a method of correcting for this bias, we could then discuss an unbiased estimate. Let us define an *unbiased* estimate as a coefficient which has been reduced by some method which approximates the error factor and results in a lower figure which is more likely to be found in another sample of data. R. J. Wherry (1931) has suggested a procedure for reducing multiple correlation coefficients and for reducing the SE of Y.

$$R' = \sqrt{1 - \left(1 - R^2\right)\left(\frac{N - 1}{N - m}\right)}$$

where R' = unbiased value of R

R = biased value of R

N = the number of classes

m = the number of predictor variables in the equation plus one.

$$\text{SE of } Y' = \text{SE of } Y\sqrt{\frac{N - 1}{N - m}}$$

Figure 4-3 demonstrates the effect of the Wherry formula. When the number of classes is large, the R' is effected very little by increasing the number of predictor variables in the equation. But when the number of classes is small, the effect of adding variables on the R' is dramatic, especially when R is relatively low. The Wherry formula permits one to estimate "the cost" of adding predictor variables. Unless the addition of a variable contributes greatly to the reduction of the least sum of squares, R' is not increased by much and may even be reduced. In this study the equation which minimized the SE of Y' and produced the maximum R' was designed as the optimum equation for a single set of data.

Figure 4-4 illustrates the change, step by step, in R, R', SE of Y, and SE of Y' for the seventh grade achievement data. The equation generated in step seven produced the maximum R' (.7903) and the minimum SE of Y' (1.414). This equation was selected as the optimum equation. Examination of R and SE of Y for the steps beyond step seven indicates the addition of more predictor variables contributes very little to the analysis.

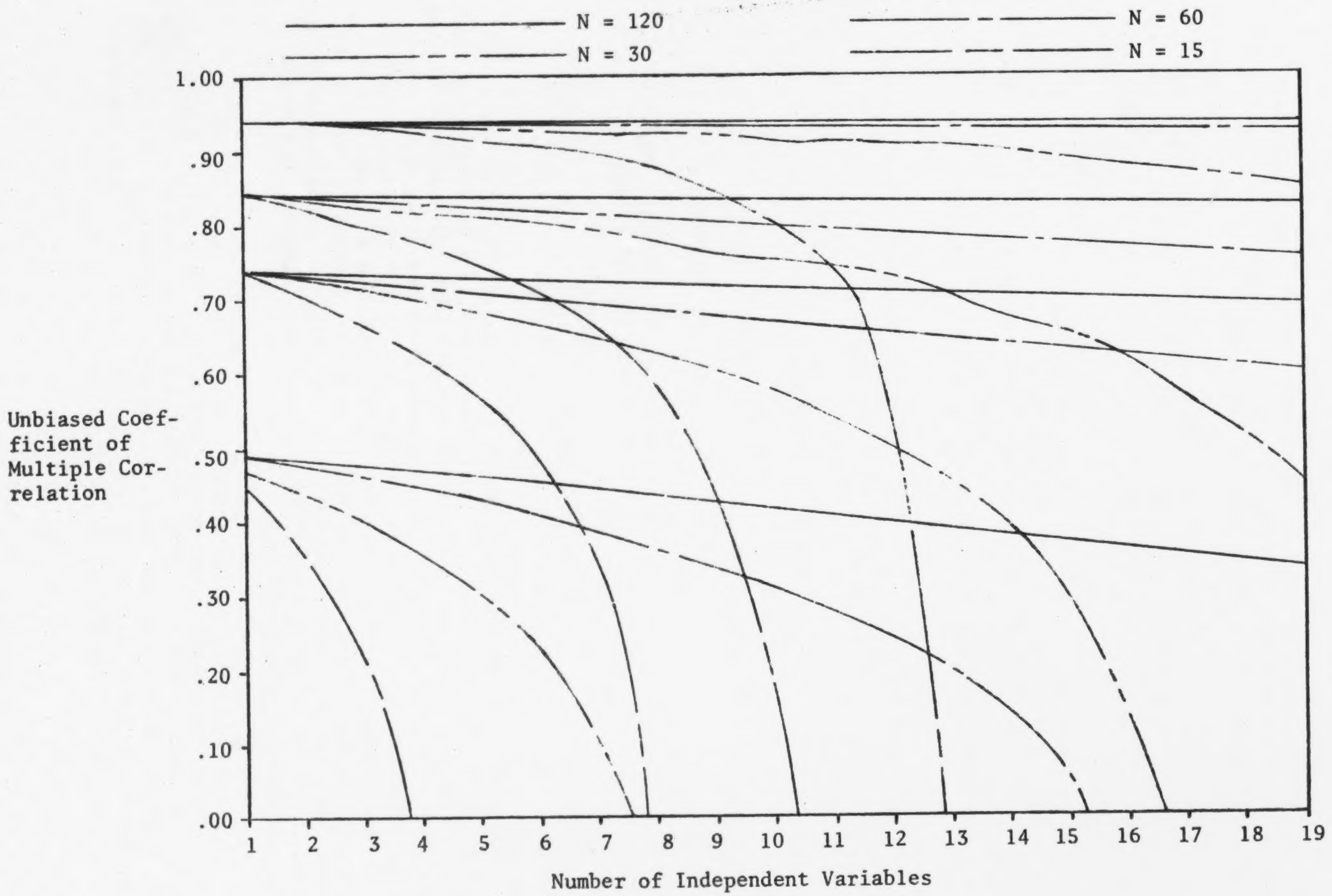


Figure 4-3.--Effect of Sample Size and the Number of Independent Variables on the Unbiased Estimate of Coefficient of Multiple Correlation. (For R = .95, .85, .75 and .50)

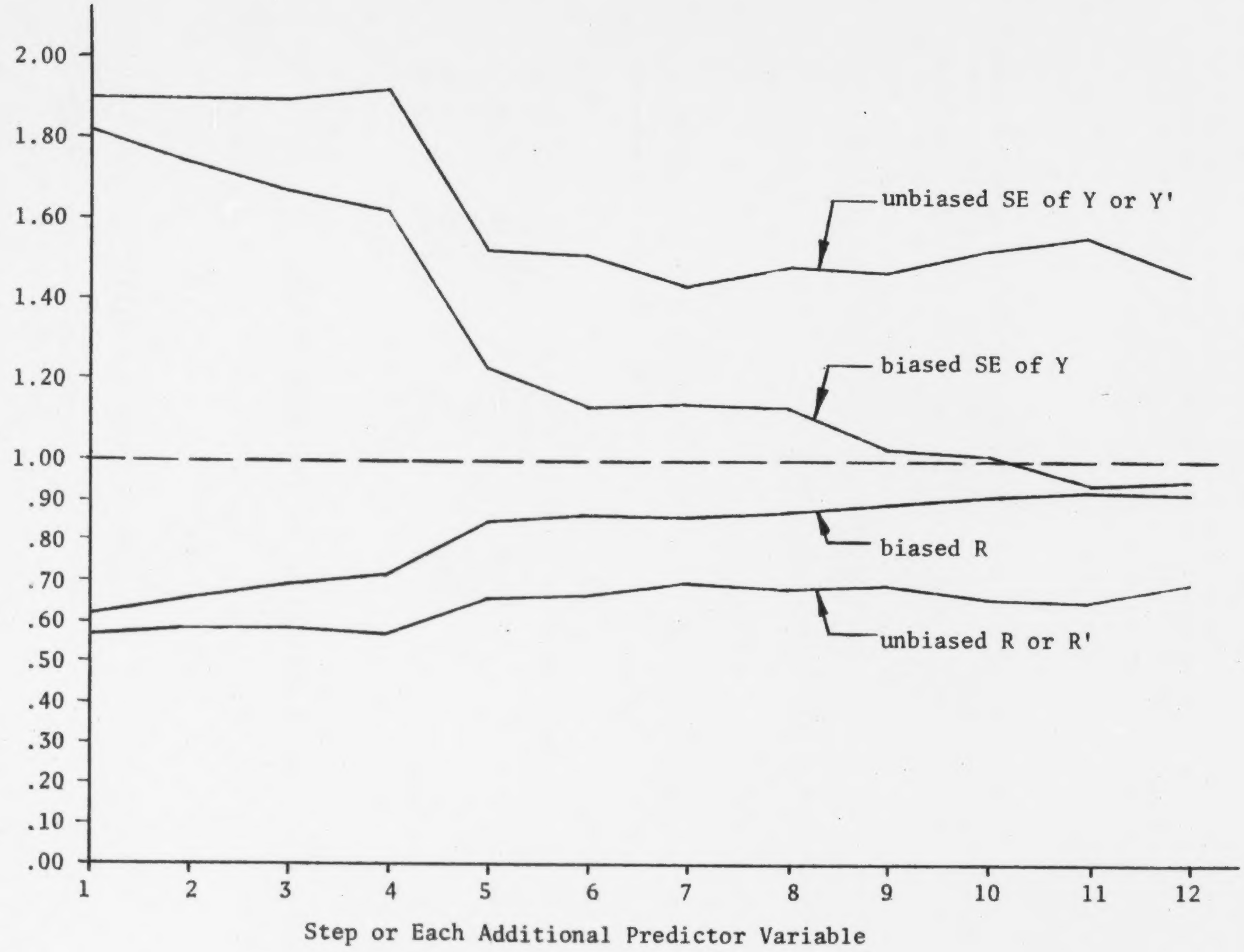


Figure 4-4.--Seventh-Grade Prediction of Post-Adjusted Achievement (27 in Pool).

The biased coefficient of multiple correlation is no artifact. It is the multiple correlation between a set of predictors and the criterion variables which actually exists in the data. The unbiased coefficient of multiple correlation is an estimate of the correlation between the predictors and the criterion variable which might be found if the equation were to be applied to several samples from the same population.

Beta Weights

Table 4-13 reports the beta weights for the optimum equation generated from the seventh grade adjusted achievement data. Beta weights are the weights that variables would have if values of all predictor variables were expressed in standard z scores. The contribution to an equation of one predictor variable relative to another can be determined by comparing the beta weights. For an example, restrictive activity and big vicious circle contribute over three times the amount that rebellion contributes to the prediction of seventh grade adjusted achievement.

TABLE 4-13

OPTIMUM EQUATION FOR PREDICTING SEVENTH GRADE ADJUSTED ACHIEVEMENT

Variable	Sd_{x_i}	r_{yx_i}	b	β
Restrictive Activity (d)	.0662	-.6056	145.23	3.15
Big Vicious Circle	.0420	-.6020	-216.19	-3.91
Rebellion	.0063	-.4565	462.11	1.25
Drill	.0380	.1374	18.75	.31
Restrictive Feedback	.0131	-.4978	-510.44	-2.86

Beta can also be defined by the following formula.

$$\beta = \frac{Sd_{x_i}}{Sd_y} b$$

where β = beta weight

Sd_{x_i} = standard deviation of the predictor variable

Sd_y = standard deviation of the criterion variable

b = partial regression coefficients of the predictor variable

Limits of the Regression Analysis

One assumption for multiple regression or correlation analysis applied to IA data is that the errors of one observation are independent of another. This assumption is violated because the predictor variables are derived from a matrix based on systematic coding of classroom interaction. The coding of one instant is dependent on what occurred during the preceding moment. The high inter-observer reliability suggests that the violation of this assumption is not overly frequent. If an observer makes an error in coding at time "n", he probably makes the same error at the "n + 1", but consistency between observers suggests that very few errors in coding are made at time "n" or, alternatively, all observers make the same error.

In addition to coding error, there is the eternal problem of coordinating variables, concepts, and inferences. These problems are expecially difficult in regression analysis. A predictor variable may serve as a suppressor variable, in one degree or another, but exactly how it works may be unknown. Even a simple zero order correlation coefficient presents a problem of interpretation. For example, small vicious circle which consists of transitions from directions to criticism (6-7) plus those from criticisms to directions (7-6), has the highest single zero order correlation with achievement in the seventh grade English and social studies core classes, but what does this mean? One inference is that teachers might attempt to reduce this kind of criticism, but alternatively only students who are well behaved might be allowed in the core classrooms. If a teacher wished to improve his teaching, it is highly unlikely that this can be accomplished merely by reducing or eliminating some one aspect of his teaching behavior; as any one type of event is decreased, other events must be increased. If it is difficult to interpret a single correlation, it is also difficult to interpret multiple correlation.

In the analysis of teaching behavior, perhaps regression analysis can be used primarily to show how a pool of interaction variables can be associated with a criterion outcome like achievement or attitude. However, we must remember that both error and valid measurement are being combined into the most fortuitous combination in order to maximize this association within a particular set of data. The resulting coefficient may overestimate the association that we can expect in subsequent, similar samples, but I am personally disposed to believe that the Wherry correction is too severe, especially if it corrects an R so that R' = 0 when, in fact, several zero order coefficients are above 0.3 absolute.

Results of the Regression Analysis

Overview

Three regression analyses are made of the data from the five grade levels. In the first analysis, the pool of possible predictors includes all of the 27 variables listed in Table 4-3. The second analysis is restricted to a pool of ten predictor variables. The third analysis investigates a fixed regression equation with ten predictors.

The main purposes of the first analysis are to satisfy our curiosity about regression analysis, to learn more about so called spuriously high correlation coefficients, and to study Wherry's procedure for estimating a more accurate value of the coefficient. The results of working with a pool of 27 predictors cannot be published as evidence about the relationships between interaction variables and outcome criteria until we know more about the limitations of multiple regression analysis, especially in terms of generalizing from our results to future samples. Using our computer program with this large number of predictors is instructive and some of the results are included in this report.

The second analysis uses only ten of the 27 interaction variables and is intended as a test of Hypothesis D across all five grade levels. The questions to be answered are first, how well can ten interaction variables predict learning outcomes, and second, are these patterns of prediction consistent with Hypothesis D?

The third analysis also tests Hypothesis D, but a single, fixed regression equation is used. The equation provides for a positive effect from indirect patterns of interaction and a negative effect from direct patterns. However, the proportional magnitude of these effects remains fixed by predetermined beta weights while in the second analysis such proportions could change from one grade level to the next. We should expect the correlation coefficients to be smaller in the third analysis compared with the second. The fixed equation assumes that the proportional influence of ten interaction variables on learning outcomes should be or is the same at each grade level. This assumption is not very promising, nevertheless, a fixed equation is one way to eliminate taking advantage of fortuitous error variance at one particular grade level.

Primary Correlation Coefficients

Altogether there are 270 primary correlations: 135 of these are with adjusted achievement based on 27 variables at each of the five grade levels; and 135 are associated with positive attitude at each grade level. Not all of these correlations are of sufficient interest to be tabled and presented at this point in the discussion. The correlations between 14 IA variables and adjusted achievement are shown in Table 4-14 and the correlations between the same IA variables and positive pupil achievement are shown in Table 4-15. The procedure for selecting these 14 IA variables from the 27 brings us to the problem of how the ten IA variables for the second and third analyses were selected.

Selecting the Ten IA Variables:--Running through the four main hypotheses of this project is a central interest in what is called indirect and direct teacher influence. All the IA variables listed in Tables 4-14 and 4-15 except flexibility (10), percent teacher talk (4), and possibly

TABLE 4-14

CORRELATIONS BETWEEN ADJUSTED ACHIEVEMENT AND INTERACTION ANALYSIS VARIABLES

Variable Number	Factor	Interaction Variable	Symbol	Grade Level				
				2nd	4th	6th	7th	8th
1	1	Indirectness$_1$	i/i+d ratio	-0.073	0.308	0.224	0.481	0.428
2	1	Sustained acceptance	(3-3) cell	-0.450	0.191	0.303	0.395	0.193
3	III	Indirectness$_2$ (Indirect activity)	Columns 1,2,3,4	0.045	-0.078	0.260	0.251	0.449
4	III	Teacher questions	Column 4	0.068	-0.188	0.106	-0.055	0.437
5	II	Teacher talk	Columns 1 to 7	0.302	0.083	0.114	0.015	0.451
6	II & IV	Restrictive activity	Columns 6,7	-0.100	-0.236	-0.042	-0.606	-0.342
7	I & IV	Restrictive feedback	(8-6) + (8-7) + (9-6) + (9-7) cells	0.175	-0.338	-0.320	-0.498	-0.433
8	IV & I	Small vicious circle	(6-7) + (7-6) cells	0.053	-0.227	-0.145	-0.620	-0.251
9	---	Praise	Column 2	0.249	-0.128	0.357	-0.228	0.297
10	---	Flexibility	(high i/d - low i/d)	-0.073	0.456	0.194	0.374	0.429
a	---	Indirectness$_3$	i/d ratio	-0.025	0.328	0.117	0.470	0.410
b	---	Indirectness$_4$	I/D ratio	-0.067	-0.076	0.181	0.253	0.320
c	---	Indirectness$_5$	I/I+D ratio	-0.080	-0.123	0.186	0.269	0.330
d	---	Indirectness$_6$	Column 1 + 2 + 3	-0.040	0.123	0.370	0.412	0.303
		Probability Criterion	$p = 0.05$	0.514	0.497	0.361	0.514	0.497
			$p = 0.01$	0.592	0.574	0.423	0.592	0.574
Number of classes				15	16	30	15	16

TABLE 4-15

CORRELATIONS BETWEEN CLASS ATTITUDE AND INTERACTION ANALYSIS

Variable Number	Factor	Interaction Variable	Symbol	Grade Level				
				2nd	4th	6th	7th	8th
1	I	Indirectness$_1$	i/i+d ratio	0.130	0.636	0.486	0.335	0.584
2	I	Sustained acceptance	(3-3) cell	0.128	0.516	0.401	0.331	0.311
3	III	Indirectness$_2$ (Indirect activity)	Columns 1,2,3,4	0.445	0.339	0.395	0.163	0.512
4	III	Teacher questions	Column 4	0.485	-0.064	0.270	0.002	0.471
5	II	Teacher talk	Columns 1 to 7	0.375	0.098	0.236	0.147	0.610
6	VI & IV	Restrictive activity	Columns 6,7	-0.090	-0.166	-0.368	-0.431	-0.657
7	IV & I	Restrictive feedback	(8-6) + (8-7) + (9-6) + (9-7) cells	0.023	-0.321	-0.287	-0.469	-0.622
8	IV & I	Small vicious circle	(6-7) + (7-6) cells	-0.215	-0.219	-0.320	-0.434	-0.589
9	---	Praise	Column 2	0.076	0.397	0.351	-0.339	0.377
10	---	Flexibility	High i/d - low i/d	0.120	0.079	0.407	0.132	0.432
a	---	Indirectness$_3$	i/d ratio	0.163	0.580	0.510	0.409	0.494
b	---	Indirectness$_4$	I/D ratio	0.212	0.301	0.241	0.135	0.332
c	---	Indirectness$_5$	I/I+D ratio	0.260	0.325	0.254	0.104	0.356
d	---	Indirectness$_6$	Column 1 + 2 + 3	0.043	0.647	0.428	0.320	0.381
		Probability Criterion	$p = 0.05$	0.514	0.497	0.361	0.514	0.497
			$p = 0.01$	0.592	0.574	0.423	0.592	0.574
Number of classes				15	16	30	15	16

teacher questions (6) can be directly coordinated to these two aspects of teacher influence. Thus, the indirect influence is represented by IA variables 1, 2, 3, 9, a, b, c, and d. The direct influence by 6, 7, and 8.

The ten IA variables finally selected for the ten predictor pool, also represent the four factors which appeared most consistently in the factor analyses. Thus, i/i+d, sustained acceptance, and restrictive feedback load quite heavily on Factor I. Teacher talk represents Factor II. Indirect activity and teacher questions load heavily on Factor III. Restrictive activity and small vicious circle generally load heavily on Factor IV. Praise and flexibility appear in the analysis upon the recommendation of the research staff. We were interested in praise because it has been singled out by other researchers and has been producing curiously inconsistent results. We were interested in flexibility, I guess, "because it is there", and seems essential to the "hope" that teachers do adjust their behavior, one situation compared with the next.

The Correlation Coefficients:--A comparison of Tables 4-14 and 4-15 shows that the correlations with attitude scores are higher than those with achievement scores. One reason for this difference may be that our attitude inventory test is a better test, that is, it measures what it is supposed to measure more accurately, compared with our achievement tests. The attitude inventory test has been subjected to item analysis each year and our efforts to improve it cover more than a ten-year period. The same cannot be said about our achievement tests which have necessarily been one-shot instruments. Another interpretation is that both achievement and attitude may be measured with equal validity, but attitudes are simply more highly associated with our interaction variables. For those who believe that having a more positive attitude toward learning, schoolwork, and the teacher is a more important educational outcome than achievement--as the latter is measured, then the higher correlations with attitude are more interesting and may have greater utility.

There is a consistency among the coefficients in terms of the indirect to direct contrast. This is most clearly seen with the attitude correlations in Table 4-15. Responsive (i.e., indirect) teaching behavior patterns form positive associations with attitude or achievement while teacher initiation (i.e., directiveness) forms negative associations. The second grade remains an exception to this generalization. Sometimes the negative predictor has the highest magnitude, most clearly seen in seventh grade achievement, but the positive predictors may also have the strongest associations, shown by the 4th and 6th grade attitude correlations.

The Fixed Regression Equation, Third Analysis

In addition to using the stepwise computer program for regression analysis with the 27 and 10 variable pools, the third analysis consisted of writing our own equation and then testing this equation at each grade level to see if it could predict adjusted achievement and positive attitude scores. The regression equation that we used tends to become an operational definition of indirect teaching, that is, indirect patterns are positively weighted and direct patterns are negatively weighted. The weights proposed are shown in Table 4-16. The three most direct influence patterns, variables 6, 7, and 8 are negatively weighted while all others are positively weighted. In this analysis, a single equation using these weights is used to calculate a predicted score. This predicted score is then correlated with the actual scores for both adjusted achievement and positive pupil attitudes.

TABLE 4-16

SUBJECTIVE CONTRIBUTION OF EACH INDEPENDENT VARIABLE TO PREDICT THE CRITERION IN EACH GRADE

Number	Variable	Achievement	Attitude
1	i/i+d Ratio	.05	.10
2	Sustained Acceptance	.025	.025
3	Indirect Activity	.075	.05
4	Teacher Questions	.025	.04
5	Teacher Talk	.05	.025
6	Restrictive Activity	-.10	-.05
7	Restrictive Feedback	-.05	-.05
8	Small Vicious Circle	-.025	-.025
9	Praise	.05	.025
10	Flexibility	.025	.025
	Constant	.875	.835

The Results From All Three Analyses

The plan of reporting, at this point, is to present the results from the 27-variable pool, the 10-variable pool, and the fixed regression equation with a minimum of comment. After the results from all three analyses are at hand, comparisons can be made within the data which will become the basis of subsequent interpretations.

Table 4-17 shows the number of predictor variables used in the multiple regression equation for the 27-variable pool, the 10-variable pool, and the final biased and unbiased correlation coefficients for each pool when the criterion is achievement. The correlation coefficients for the fixed regression equation are also shown. The same data when attitude is the outcome criterion are shown in Table 4-18.

To illustrate how each step contributes to a multiple correlation coefficient, the curves for the 6th, 7th, 8th, and these three grades combined are shown in Figures 4-5 and 4-6 for the 27-variable pool. The stepwise increment curves for the second and fourth grades are not presented, nor are the curves for the 10-variable pool.

TABLE 4-17

RELATIONSHIPS OF PREDICTED ADJUSTED ACHIEVEMENT TO ACTUAL ADJUSTED ACHIEVEMENT WHEN VARIOUS REGRESSION EQUATIONS ARE USED

Source	Row Entry	Grade				
		2nd	4th	6th	7th	8th
Using a pool of 27 IA variables	Number of variables Biased R Unbiased R'	9 .969 .911	12 .979 .892	12 .836 .718	5 .871 .790	13 .998 .986
Using a pool of 10 IA variables	Number of variables Biased R Unbiased R'	8 .876 .677	6 .764 .553	3 .484 .418	1 .620 .580	7 .831 .666
Correlation when 10 IA variables with fixed weights are used.		-.051	.260	.284	.513	.449

TABLE 4-18

RELATIONSHIPS OF PREDICTED ATTITUDES TOWARD TEACHER AND CLASS TO THE ACTUAL ATTITUDES WHEN VARIOUS REGRESSION EQUATIONS ARE USED

Source	Row Entry	Grade				
		2nd	4th	6th	7th	8th
Using a pool of 27 IA variables	Number of variables in optimum equation Biased R Unbiased R'	12 .991 .939	11 .989 .949	7 .674 .530	12 .999 .996	10 .996 .895
Using a pool of 10 IA variables	Number of variables in optimum equation Biased R Unbiased R'	10 .928 .715	9 .981 .951	2 .520 .465	1 .469 .405	3 .768 .698
Correlation when 10 IA variables with fixed weights are used.		.303	.466	.483	.356	.672

The beta weights for the optimum regression equations for all classes, for both the 27- and 10-variable pools, and for achievement and for attitude are shown in Tables 4-19 and 4-20. In making interpretations of these beta weights, it should be remembered that the algebraic sign provides no particular

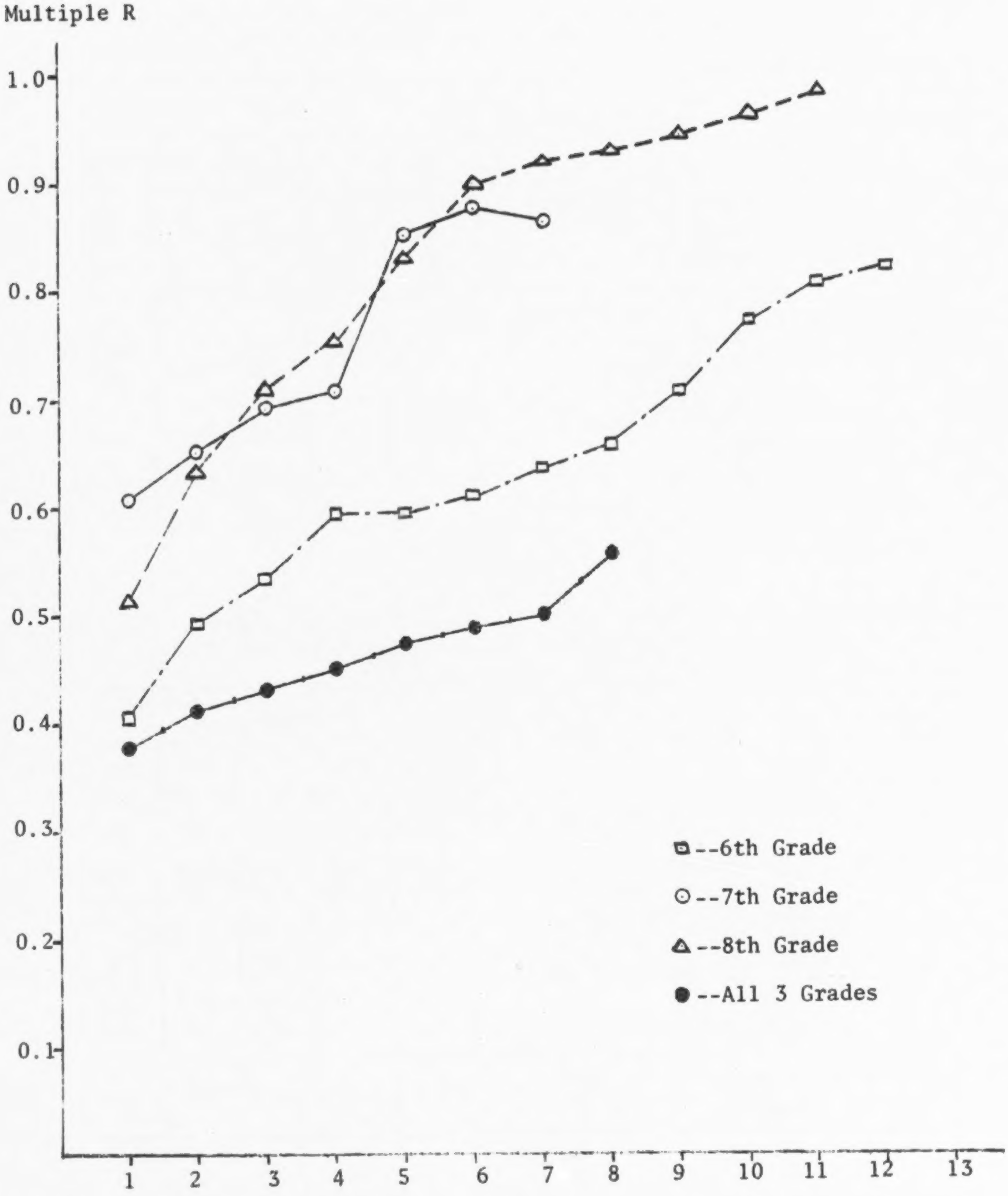


Figure 4-5.--Uncorrected Correlation Steps with Achievement--(27 Predictor Pool).

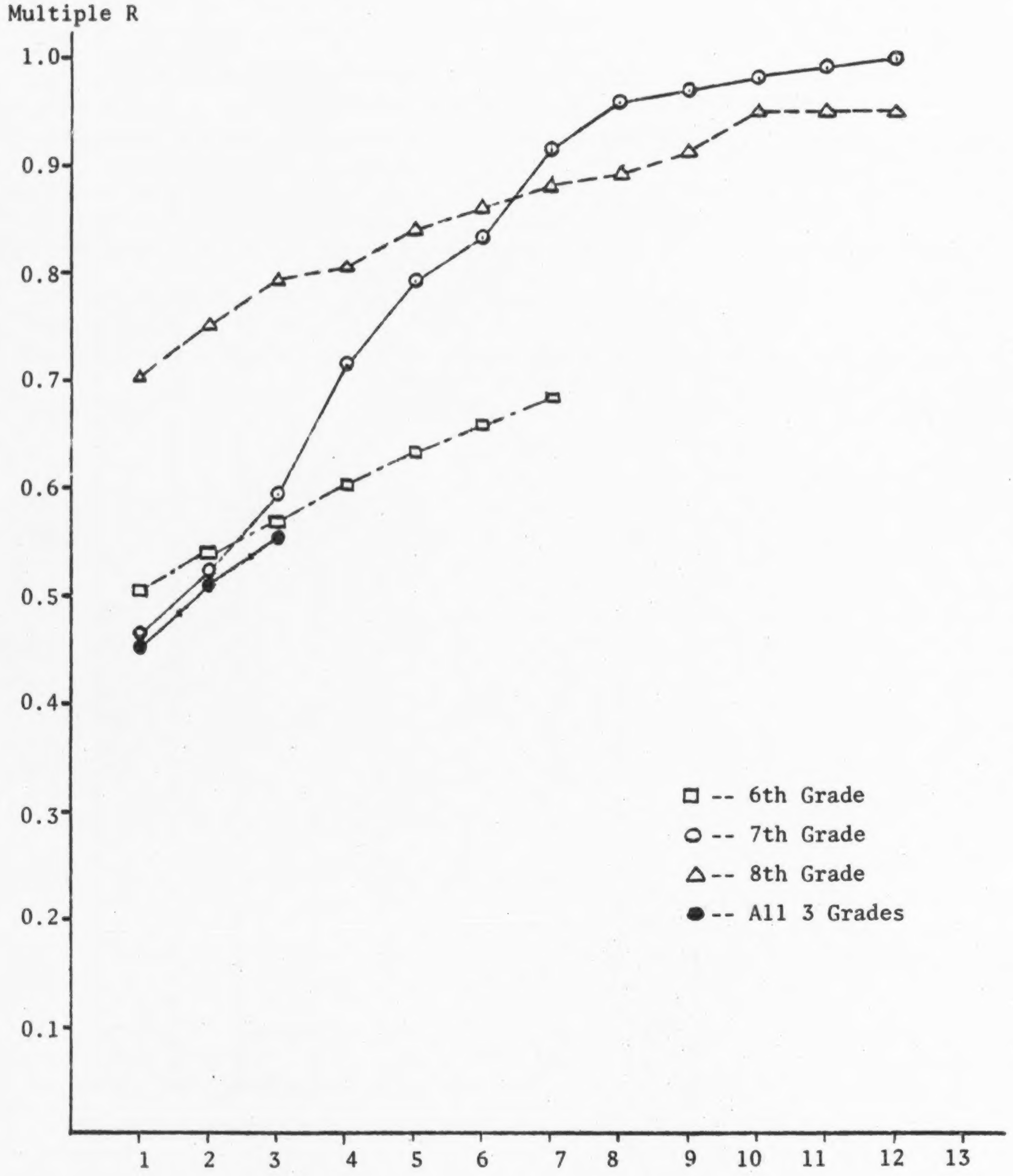


Figure 4-6.--Uncorrected Correlation Steps with Attitude--(27 Predictor Pool).

TABLE 4-19

THE BETA WEIGHTS OF THE PREDICTOR VARIABLES IN THE OPTIMUM REGRESSION EQUATION TO PREDICT ACHIEVEMENT

Variable Name	Grade									
	2nd		4th		6th		7th		8th	
	Number of Variables[b]									
	27	10	27	10	27	10	27	10	27	10
i/d Ratio			- .70		- .80					
i/i+d Ratio[a]		2.47		-1.65	2.84				1.35	
I/D Ratio										
I/I+D Ratio										
Expansive Act. (i)										
Restrictive Act. (d)[a]						.25	4.15		3.18	3.43
Indirect Act. (I)[a]		-2.09		7.71	6.73					-1.57
Direct Act. (D)									.28	
Teacher Talk (I+D)[a]										.24
Directed Stu. Resp.									.62	
Stu. Init. Resp.			- .61		- .60				.24	
Student Talk			.34							
Small Vic. Circle[a]		.51	-2.04	-1.10				-.62	-1.84	-1.53
Big Vic. Circle	- .21		1.78		.65		-3.91		1.98	
Rebellion	- .51		1.46				1.25		.66	
Teacher Questions[a]		2.57	- .46	-7.68	-4.97					1.78
Teacher Lecture										
Content	4.70		3.53							
Content Cross	-2.84		-4.23							
Drill			1.18				.31		.47	
Lecture & Drill	-1.46									
Sustained Accept.[a]	-2.66	1.57		-1.77	-2.92				2.14	
Sust. Expans. Act.	2.01				1.32				-3.59	
Praise[a]	- .91	.49		-2.53	- .47	.33				
Reward					-2.79					
Rest. Feedback[a]	.86	- .66	-1.99		.25	-.39	-2.86		-2.25	-1.48
Flexibility[a]		-1.61	.47	.47	- .41				1.51	1.53

[a] These variables are the ten variables which were selected from the twenty-seven for analysis.

[b] The number, 27 or 10, indicates the number of independent variables which were available for the stepwise linear multiple regression analysis.

TABLE 4-20

THE BETA WEIGHTS OF THE PREDICTOR VARIABLES IN THE OPTIMUM REGRESSION EQUATION TO PREDICT ATTITUDE TOWARD THE TEACHER AND CLASS

Variable Name	Grade									
	2nd		4th		6th		7th		8th	
	Number of Variables[b]									
	27	10	27	10	27	10	27	10	27	10
i/d Ratio	- .40				.73		-1.04			
i/i+d Ratio[a]		9.60		2.29	- .72	.41				
I/D Ratio	-6.42		1.87				-2.54		-3.71	
I/I+D Ratio	10.26									
Expansive Act. (i)			-3.88				1.59			
Restrictive Act. (d)[a]		6.51		4.86				-2.36		-.24
Indirect Act. (I)[a]		-20.48	-2.16						1.75	
Direct Activity (d)	1.60								-1.37	
Teacher Talk (I+D)[a]		1.56	-1.91	.27			4.75			.44
Directed Stu. Resp.	- .64									
Stu. Init. Resp.									1.02	
Student Talk										
Small Vicious Circle[a]		- .83		-1.53			.26		6.51	
Big Vicious Circle			.83				.50		-2.64	
Rebellion							1.91		-5.34	
Teacher Questions[a]	-1.18	16.78		- .50						.34
Teacher Lecture					-1.05					
Content					1.33					
Content Cross	.40		3.66							
Drill	-1.85		- .75				6.92		1.41	
Lecture & Drill					2.50					
Sustained Accept.[a]	1.34	.87	.55	-2.36						
Sust. Expans. Act.	-1.49		2.25		.50		1.13			
Praise[a]		-.37		.82	.14	.20	-3.01		.84	
Reward			3.68						- .72	
Rest. Feedback[a]	1.20	1.165		-2.32			-1.89			
Flexibility[a]	.68	-27.23	- .31	.53			.33			

[a] These variables are the ten variables which were selected from the twenty-seven for analysis.

[b] The number, 27 or 10, indicates the number of independent variables which were available for the stepwise linear multiple regression analysis.

interpretation and is a less valid indicator of that variable's influence than the algebraic sign of the original zero order correlation coefficient. Also the suppression phenomena in multiple correlation means that a particular interpretation of a beta coefficient should be made with care. Some of the contradictions which can arise among beta coefficients are discussed in the next section. A summary of these results now follows.

The Factor Analyses:--At each grade level factor analysis tends to produce fairly consistent and understandable factors. Factor I is loaded on one side with i/i+d type indirectness and Category 6 and 7 type directness. Factor II has to do with teacher talk, content emphasis, and student response talk (Category 8). Factor III has to do with teacher questions, the I/I+D type of indirectness, and is negatively loaded with student initiation talk (Category 9). Factor IV in the 4th, 6th, and 8th grades, is concerned with restrictive teacher influence, like Category 7, which might be concerned with discipline. In the 7th grade, it approaches student initiation combined with teacher response and reinforcement.

The Three Regression Analyses in General:--There is no doubt that the correlations are highest when a 27-variable pool is used, next highest when a 10-variable pool is used, and least high when a fixed equation is used. The freedom of a computer program to select from a greater variety of variables does produce higher multiple correlation coefficients. The final coefficient may not be the product of THE most effective combination, but the computer program probably comes very close to selecting the most effective combination.

Attitude Versus Achievement:--In nearly every case, but not quite all cases, associations with attitude are higher than with achievement. This same observation was made of the primary correlation coefficients.

The Wherry Correction:--The adjustment to change a "biased" to an "unbiased" estimate seems to be rather irregular. By running the multiple correlations through additional steps, the coefficients tend to exceed 0.90. As soon as this happens the adjustment is small until there are more than 11 steps, given only 15 classrooms (see Figure 4-3). On the other hand, the correction is devastating for even a few steps when the unbiased correlation is below 0.50. Furthermore, the decision to stop the stepwise analysis at that step which produces the highest unbiased R' (the minimum SE of Y') leads to rather inconsistent results. In two cases in the seventh grade, for example, only one predictor variable is used. This early termination limits the information which the analysis produces.

The Beta Weights:--The mysteries of multiple regression are quite apparent in a display such as Table 4-20. Consider the beta weights in the ten variable column for the fourth grade, for example. How can i/i+d and restrictive activity both have positive beta weights? And how can small vicious circle and sustained acceptance both have negative weights? The effects of suppression, which have already been discussed, provide us with an explanation. However, this explanation also results in concluding that the algebraic sign and the magnitude of the beta weight cannot be given psychological interpretations when a stepwise program of this type is used. Perhaps the only interpretation of beta weights which remains is simply to point out which variables were chosen by the program.

Hypothesis D:--This hypothesis states that educational outcomes such as positive attitudes and achievement will be higher in those classrooms in which there is more indirect teaching behavior. In earlier chapters an association supporting this hypothesis, not due to chance, was found to be present at all grade levels except the second. Some qualities of this relationship are shown in the second and third regression analyses. We know that variables which are based on indirect and direct patterns appear in our factor analysis, in our beta coefficients, and were purposely a part of the fixed regression equation. We also know that the direct and indirect variables operate consistently and inversely in the association between interaction and learning outcomes so that the fixed regression equation could be and was written.

What I find most interesting in the factor analysis and stepwise linear regression are the higher correlation coefficients and the importance of variables other than direct and indirect. These higher multiple correlations apparently require variables which come from Factors II and III, yet Hypothesis D is concerned primarily with Factor I, the direct-indirect variables. One way to interpret this is to say that while variables based on the direct-indirect continuum are helpful, these variables alone are limited compared with the combined pool of ten variables.

Main Conclusions and Inferences

This section includes a discussion of the conclusions and inferences from both Chapters III and IV. This includes the analyses of the data from the sixth, fourth, and second grade levels as well as the seventh and eighth. It also includes the stepwise linear regression with the ten variable pool and the fixed regression equation. These discussions will be arranged around key questions.

Does a Teacher Vary His Behavior in Particular Ways?

Hypotheses A and B are concerned with variations of directness and indirectness during classroom interaction. In general, the model behind these two hypotheses is that indirectness should be above average when goals are being clarified, activities are just getting underway, or difficulties are being diagnosed. Later on, when difficulties have been reduced and goals made clear, then indirectness should be expected to be below average. In this context, directness has a reciprocal relationship with indirectness. It is possible that most teachers tend to act in ways that are the opposite of this model. When goals are unclear, for example, teachers may tend to become more direct, not less.

Hypotheses A and B were supported in one earlier study by Flanders (1960). It is unfortunate that no information of a definitive nature was secured in the sixth, fourth, and second grades. While it makes sense to believe that variation of interaction patterns should be lawful, the present project cannot add or subtract from our present knowledge of such relationships.

Is the Variation of Teaching Behavior Related to Outcome Criteria?

Hypothesis C has to do with flexibility of teacher influence during classroom interaction. Even though we cannot predict how teaching behavior varies during interaction, we can test the idea that some kind of change is occurring more or less continuously. Teachers who have a higher index of flexibility are more likely to make adjustments in their own behavior from one teaching situation to the next or at least responding differently to interaction opportunities, one situation compared with another.

Several methods of quantifying flexibility have been reported. In Tables 4-14 and 4-15, flexibility is merely the lowest i/d ratio subtracted from the highest. This measure shows fairly strong associations with attitude measures in the 6th and 8th grades and strong associations with achievement in the 4th, 7th, and 8th grades. In a separate analysis of 6th grade data, the standard deviation of i/i+d ratios was significantly associated with achievement and attitude. Finally, in the 4th grade, an index called the MFR (Miller flexibility ratio) was shown to be significantly associated with achievement and attitude. There were no significant associations found in the 2nd grade data. In the second grade analysis, however, still another method of quantifying flexibility was tried out. This method consisted of having the computer calculate an i/i+d ratio for every consecutive, but non overlapping 100 tallies. This method of quantifying may have merit, unfortunately its utility could not be determined by applying it to the second grade data.

The notion that flexibility can be and should be an important variable in the analysis of classroom interaction rests on good reasons. Teachers who do adjust their teaching behavior (or whose behavior is adjusted) from one situation to the next are demonstrating a feature of interaction which is essential to any theory which attempts to explain different teaching patterns. There is some evidence (Flanders, 1963) to suggest that below average teaching is more consistent (or rigid) and less flexible than is likely to be found in above average classrooms.

Once a researcher becomes interested in analyzing flexibility of teaching behavior, the present methods of quantifying the variable soon become unsatisfactory. To know that patterns vary, one situation to another, is merely to know that variation within interaction segments is an interesting phenomenon. The next obvious step is to investigate specific hypotheses such as Hypotheses A and B. Since these latter hypotheses have been unproductive, so far, perhaps flexibility should be investigated on a more empirical basis, that is, without hypotheses. As matters now stand, we know that features of interaction such as the i/d or i/i+d ratios do vary, one time segment compared to another, but we don't know how or why, except at the most primitive level. Knowing that measures of flexibility seem to be associated with more positive attitudes and higher achievement indicates that investigations in this area are likely to be rewarding.

Is Indirectness Associated with Pupil Achievement and Attitudes?

Hypothesis D states that there is a positive association between indirectness during all phases of instruction and the outcome variables of achievement and positive attitude. This association was found to be present in four of the five grade levels reported, being absent only in our second grade sample. This finding does not answer any questions regarding cause and effect. The presumption that the teacher influences interaction and that the pupils also influence interaction still seems the most reasonable.

Besides Indirectness?

To me the most interesting products of the research on the 6th, 4th, and 2nd grade levels are the factor analyses at each grade level and the inclusions of Factors II, III, and perhaps IV in the regression analysis. Factor I consists of the indirect-direct continuum and represents different types of teacher response and initiation. Most of the previous research with the FIAC system has focussed on this first factor, primarily by making use of such variables as the i/d and i/i+d ratios. As late as 1966 research workers in this field had made no clear distinction between these two ratios and the corresponding I/D and I/I+D ratios. Both types of ratios were used to quantify what was called "indirectness".

The first contribution of the factor analysis was to separate the revised i/d and i/i+d ratios from the I/D and I/I+D ratios. The essential differences, of course, are that "I" contains Category 4 and "D" contains Category 5. This greater content emphasis in "I" and "D" can be found in teacher initiated questions and teacher lecturing. This emphasis appears to vary in ways that are different compared with Category 3 and Category 6. Thus, the distinction between a kind of indirectness which is essentially social in its nature from a kind of indirectness which is both social and subject matter oriented results in two factors where one was presumed to exist.

The factor analysis produced a total of four factors. It is interesting that some of the highest multiple correlation coefficients ever published between a learning outcome and process variables went beyond mere directness-indirectness and made use of variables from other factors. Taking the second regression analysis as an example, with its pool of ten variables, we can obtain enough predictive power from the four factors to sustain high multiple correlations even in the second grade. Thus, the combination of indirectness, teacher lecture--drill and student response, teacher questions and drill, and teacher criticism and restrictive control creates four separate factors and provides a broader base for establishing correlations with outcome criteria. In the event that further research replicates this minimum four factor pool, one might decide that interaction is indeed associated with outcomes.

Chapter Five

HELPING TEACHERS MODIFY THEIR CLASSROOM INTERACTION PATTERNS

Overview

Your attention is called to the discussion of the fourth year of this project, starting on page 10 of Chapter One, in which a comparison between the original proposal and the final plan of the inservice training is made. As revised the objectives of the inservice training were: (a) to test a new "plan of personal inquiry" by using it as the basis of the training activities; (b) to see if such training modified classroom interaction patterns; and (c) to see if change is related to socioeconomic conditions of the school district.

This chapter covers the procedures which we used to assess classroom interaction patterns, the general design of the investigation, the data we collected, and the methods of analysis which we used. The chapter ends with a discussion of the conclusions and implications.

Procedure and Sequence of Events

Time was spent during the beginning of the 1968-69 academic year gaining access to schools and classrooms. By mid-November, thirty-one sixth-grade teachers from twelve schools near the Metropolitan Detroit area volunteered to participate in the study.

The research design called for two groups, experimental and control, with data on classroom interaction to be collected before and after training. The division between control and experimental was accomplished by designating those teachers who could work together easily in teams of two and three as the experimental group (n = 19). The remaining twelve teachers became the controls. We did not match the two groups by sex, age, or teaching experience. Thus, the experimental group was composed of ten females and nine males as compared with nine females and three males in the control group. The classroom experience for the experimental group ranged from zero to nineteen years; for the control group the range was one to twenty-one years.

On November 25 and 26 the research staff met with the nineteen teachers in the experimental group. This orientation period provided an opportunity for the teachers to find out more about the study. Materials for personal study were handed out. The group discussed two kinds of lesson plans (Lesson A and B) which would be required by the research design and developed several lesson plans together. Teachers were given instructions about how to administer paper and pencil inventories, which they would be doing in their own classrooms. They spent considerable time discussing their reactions to the prospect of being recorded while teaching. That is, they spoke about their anxiety, the possible changes in their teaching behavior, and the possible responses which their students might make to the situation.

Pre and Post Data Collections.

Like other projects designed to evaluate a curriculum, this study involves comparing an experimental group with a control group based on data collected before and after the experimental group had its training.

Baseline interaction data were collected in all thirty-one classrooms, both control and experimental, by making voice sound recordings during regular academic instruction. Although it was necessary to schedule such voice recordings with each teacher, no attempt was made to influence the subject which a teacher taught or the teacher's preferred method of teaching. Thus, a visit might occur when spelling, reading, math, social studies, science, or language arts was being taught. This variation of teaching purpose undoubtedly increased the variance of variables which were based on coded classroom interaction. Such unwanted variance does not bias the evaluation in favor of the experimental group, however, since the effect would tend to cause the null hypotheses to be accepted rather than rejected. The flaw, then, is that comparisons between the two groups are more likely to be conservative.

All the experimental teachers, but not controls, were asked to teach similar lessons on three separate occasions. Lessons "A" and "B" were taught before training, just after training, and six weeks or more after training. Lesson "A" was called a more open lesson in which pupils were encouraged to express their own ideas about some topic, for example, "How much noise should there be in a classroom?", or "How can we promote more sportsmanship on the playground?" It was the teacher's job to see that children were encouraged to express their opinions, to see that summarizations were made, and conclusions were reached whenever this seemed possible. The "B" type lessons were not so open since instructional materials were used and the teacher's purpose was to encourage pupils to reach conclusions and state them as generalizations. For example, a handout sheet would show an island with only a few main features such as mountains, plains, rivers, possible ports, and a few natural resources. The class discussed what was on the map and then tried to predict which parts of the island would be settled first, how land would be used, how transportation routes would form, and so on. If possible, the teacher was to question all conclusions and generalizations by asking why a pupil thought a particular statement was true. It was assumed that this type of lesson would require a teacher to take a more active role. Each experimental teacher taught both lessons on the three occasions already mentioned and these lessons were sound tape recorded. It is unfortunate that we did not have a large enough staff and the resources necessary to record similar lessons for the teachers in the control group.

The Inservice Training Program

The teachers in the experimental group attended twelve, all-day, inservice training sessions beginning in January and continuing into February. Two terminal sessions were held in March. Substitute teachers were provided at the expense of the project. Sessions usually began at nine AM and terminated at three PM. Space was provided in a school that was conveniently located for most teachers.

The training curriculum in general:--The plan was to help teachers learn more about teacher questions and teacher responses to pupil statements, to carry out individual inquiry projects on these features of classroom interaction after the necessary inquiry skills had been practiced, and to discuss the results of these inquiry projects with other teachers.

Teachers received mimeographed materials which explained the ten Flanders Interaction Analysis Categories (FIAC), ways that these categories can be used for classroom observation, and ways that they could be used in an inquiry project. The material explained matrix tabulation and time-line displays. Other material contained a more philosophical discussion about teacher initiative and domination during teaching and how such patterns stimulated pupil compliance and failed to support pupil initiative.

During the all day training sessions teachers had the opportunity to make use of the above materials. For example, they had a chance to practice using FIAC in order to code verbal communication played back on a tape recorder. They participated in simulated social skill training sessions which focussed on asking questions and responding to statements made by others. There were sessions during which the teachers discussed contrasting teaching styles. They analyzed the differences between indirect and direct teaching models and discovered that it would be useful to have a more objective way to assess specific dimensions of teaching and classroom interaction.

The schedule of all day sessions was such that four to eight teaching days occurred between pairs of inservice days. This meant that there was time to read material, practice coding in a partner's classroom, and to experiment with one's own class provided a teacher chose voluntarily to work on such projects.

A model of inquiry:--One of the more subjective questions we had, with regard to training, was whether teachers have enough initiative and self-direction to use a generalized model of inquiry in an effort to modify their teaching. If such a model gave too little direction, teachers might need a much more specific program in order to accomplish desired changes. Researchers who favor using a more general model of inquiry for inservice training might argue that teachers are already too dependent prone, they act dependently toward their own superiors, and then quite consistently tend to dominate in their contacts with subordinates, therefore a more general program might provide teachers with an opportunity to experience learning in a context of less dependency. Yet if this opportunity to act more independently merely frustrated the teachers and they failed to make progress, then one might be justified in postponing a more independent approach until after a more closely supervized start has been accomplished. Just like youngsters, teachers cannot be expected to direct their own activities until they understand the goals, have the necessary skills, the motivation, the self-confidence, and the opportunity.

In order to provide a generalized model of inquiry, five steps were introduced to the teachers. These steps were designed for use with any behavior modification or personal goal that a teacher selected. Thus, the approach was open with regard to selecting any aspect of teaching behavior for study. The approach was somewhat structured with regard to the five steps; that is, teachers were not only taught the five steps, they also had a chance to follow these five steps on various inquiry projects during the inservice days. In this way, it was possible for the staff to supervize the initial inquiry experiences of the participating teachers.

The five steps now follow.

1. SPECIFYING THE TARGET PUPIL BEHAVIOR: a teacher, usually working with a partner, specifies a pattern of "target pupil behavior" that he would like to have occur.

2. SPECIFYING COMPLEMENTARY TEACHING BEHAVIORS: a teacher, who will be actor, and his partner, who will be observer, discuss two or more patterns of teaching behavior which will support, encourage, or provoke the desired target pupil behavior.

3. PRACTICING TEACHING PATTERNS AND OBSERVATION SKILLS: the teacher practices in order to make sure that he can perform the two or more teaching patterns in spontaneous situations and his observer-partner practices whatever coding techniques will be required to collect evidence during the inquiry project. This practice can occur with any small group of three to six children meeting in a corner of the classroom or out in the hall. This kind of practice is similar to or identical with microteaching.

4. PLANNING A COMPARISON: Step Three helps to sharpen the teacher's awareness of the relationships between teaching behavior and pupil behavior. This awareness grows into a miniature theory and testing the theory can become part of the inquiry. Such inquiry is designed around particular comparisons and the purpose of Step Four is to plan these comparisons. It may be that two patterns of teaching behavior will be compared to see which one seems to produce a desired outcome. Perhaps the same teaching behavior will be tried out in two or three different situations, or with two kinds of children, or at two different points in a learning cycle. In any case, comparisons are planned and the outcomes predicted before Step Five.

5. COLLECTING AND ANALYZING THE DATA: The plan is carried out. The partners study the data to see if the two patterns of teaching behavior were actually created and whether the target pupil behavior appeared. Relationships between teaching behavior and pupil behavior are discussed in terms of the results. The partners may wish to discuss their own skill in helping each other during inquiry and how the next inquiry project can be made more effective.

It was made clear to all teachers that learning how to design and carry out inquiry projects was a major purpose of the training. Forms for reporting individual inquiry projects were distributed, explained, and discussed early in the program. Time to design the first inquiry project was provided during an inservice day. The expectation was that two partners would find time to help each other. Early in the program, all building principals were contacted and two requests were made: first, whenever a teacher in the experimental group made a request for assistance in conducting an inquiry project, the principal should do his best to be of help (e.g., arranging for a tape recorder, or covering one class while one teacher helped another); second, the principal was not to initiate or make offers of help even though he was allowed to act interested in the teacher's reactions to the training. These requests were made because we knew support by a principal is most desirable whenever a teacher is attempting to analyze his own teaching, but this might spoil the comparisons in our research design. All inquiry activities by teachers should be directed and initiated by the teachers themselves except for the help that the staff gave during the first project and the "show and tell" days in which teachers shared their completed projects. In general, these standards with regard to help were successfully accomplished since one result was that the number of inquiry projects per teacher showed a wide range. One teacher only grudgingly helped a partner and barely finished one superficial project. Some other teachers completed more than ten projects, most of high quality. The inservice sessions early in January were considered to be part of a learning period. The last week of January and the month of February were considered to be the period for designing and conducting team projects.

Minor curriculum features:--The major emphasis on inquiry projects and using some form of interaction analysis was supported by other specific training experiences. For example, several hours were devoted to learning how to write behavioral objectives, since this skill was essential to steps one and two of the inquiry projects. A day and one-half was devoted to micro-teaching and every teacher finished one teach and reteach cycle. A subjective reaction should be mentioned, however: it was my personal judgment that the microteaching session was too complicated, too hurried, and that the preparation of the teachers failed to help them locate significant purposes for their microteaching design. One explanation is that it is very difficult to run four microteaching stations in the same school, on a tight schedule, when the training staff, the teacher trainees, and the faculty and children of the host school were all inexperienced in conducting such an activity.

Another minor feature of the curriculum was the attempt by the training staff to have its own teaching analyzed. There were several periods in which all those participating in the program discussed progress and made suggestions for changes. In some simulated demonstrations members of the staff acted as teacher and participated in an analysis of the interaction. In this way the staff tried as best it could to demonstrate a sense of curiosity and inquiry into one's own teaching.

Post Meeting Reaction Sheets (PMRS)

The same PMRS was administered six times during the ten week period of the inservice training. A single copy is shown in the Appendix. On most of the items a participating teacher can mark a rating to indicate his perception of the training activities and then for the same item, he can mark what he had expected or what he would have preferred.

Combining items into scales:--Certain items were clustered and interpreted as a single scale when it could be shown that the responses were intercorrelated and when item meaning (in English) was enhanced rather than distorted by forming the cluster. For example, items 2, 3, 5, and 6 were combined into one scale in order to measure the extent to which teachers perceived the training program to be staff directed versus teacher directed. The intercorrelations for these items on the fourth administration are shown in Table 5-1. Items 2, 3, and 5 are clearly intercorrelated and will be grouped together in all analyses. Item 6, which has lower correlations, will be included because it is not negatively correlated and its meaning is related to staff versus teacher initiative.

TABLE 5-1

ITEM INTERCORRELATIONS

Item	2	3	5	6
2	x	.72	.58	.26
3		x	.60	.37
5			x	.35
6				x

Interpretation of some PMRS items:--The following graphs illustrate average perceptions and preferences along a time line representing the six administrations of the PMRS.

The teacher perceptions and preferences during the ten weeks inservice training program can best be interpreted in terms of three major periods. During the first four weeks, the training was primarily a learning period. The teachers were learning the observation procedures of interaction analysis, the stating of clear goals and how to conduct personal inquiry projects. The four administrations coincide with the four weeks.

The second phase of the program which lasted three weeks was primarily a work period. During this period the teachers were conducting individual projects in their own schools with their own students. The inservice days were devoted primarily to reports by teachers of experiments or observation projects which they had carried out. The fifth administration represents this period.

The last three weeks were a continuation of individual projects, but the inservice days were devoted to evaluation of the total workshop and to administrative details such as the giving of an achievement test to teachers and collecting other data. The sixth administration covers this period.

The individual graphs represent both what was perceived and what was preferred. The distance between the two lines illustrates dissatisfaction, since it is proportional to the difference between what was perceived and what was preferred.

Figure 5-1 shows whether the teachers thought that program was very theoretical or very practical. The interpretation we choose to make from this graph is that the teachers saw the training as increasingly more practical as it progressed. Also the teachers showed a constant preference for even more practical training. The sixth administration which was the administrative period, showed some decrease with respect to being practical. The training activities were indeed less practical during the sixth week when viewed in terms of personal growth.

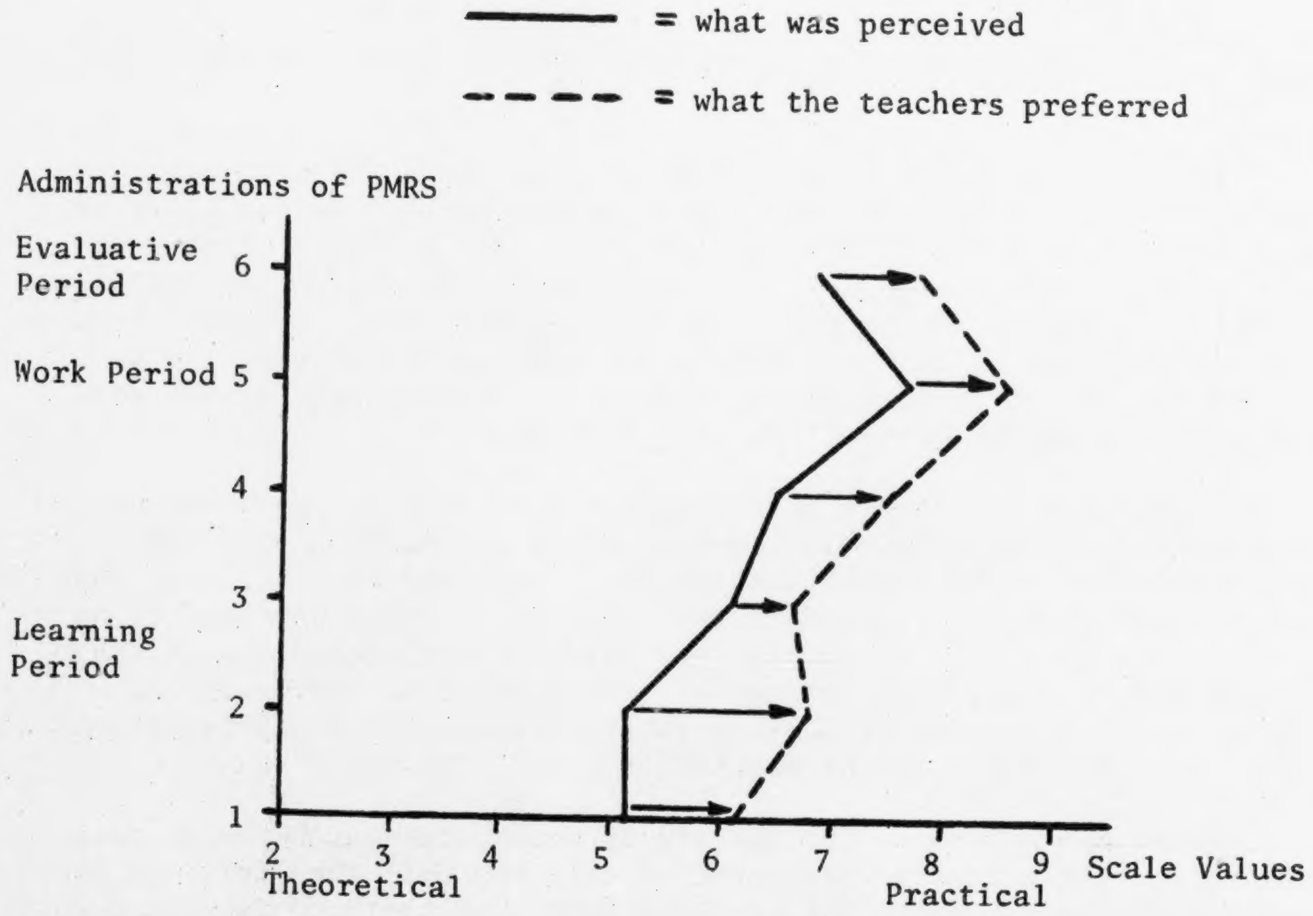


Figure 5-1.--Teacher perceptions and preferences--Theoretical-Practical.

Figure 5-2 deals with the dimension of formal and informal aspects of the inservice training. The major features of this graph indicate that the teachers perceived the training as being informal and becoming slightly more informal as time progressed. They showed a slight and constant preference for the workshop to be even more informal.

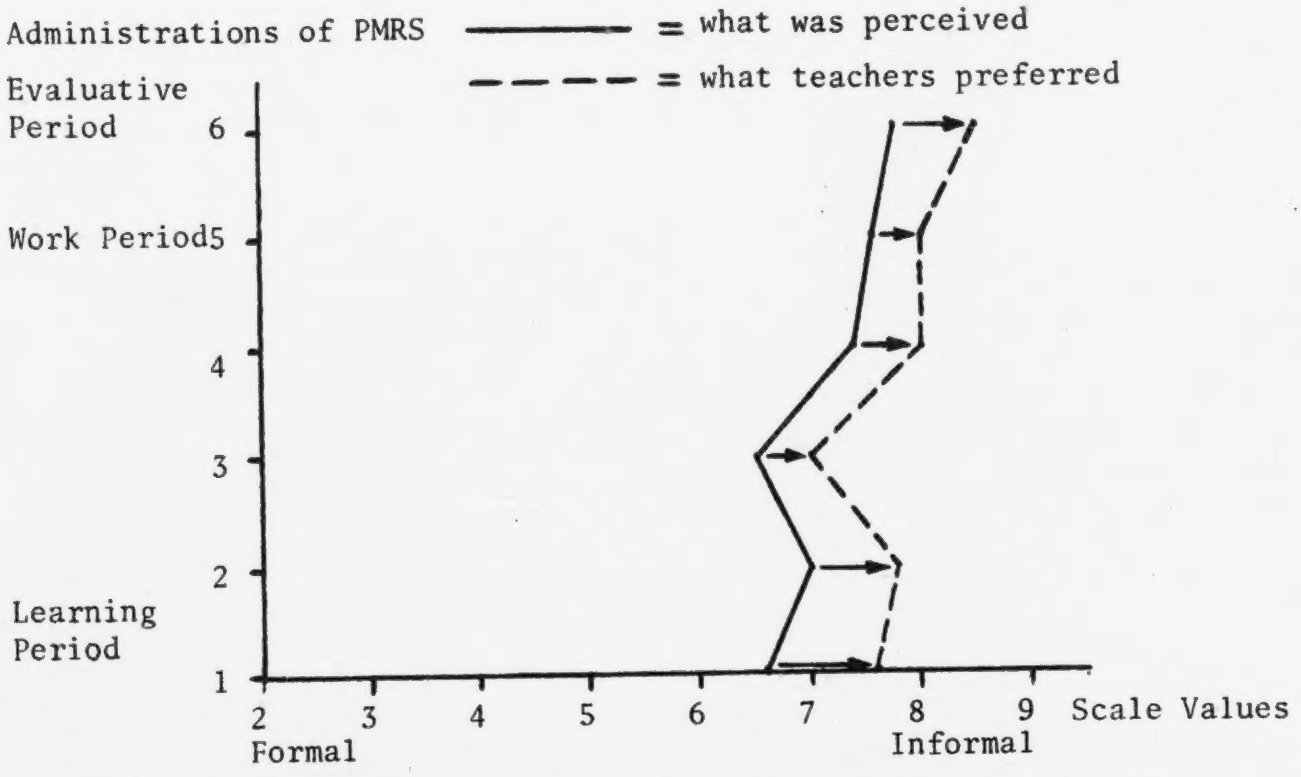


Figure 5-2.--Teacher perceptions and preferences--Formal-Informal.

Figure 5-3 is based on a cluster of four items which pertained to whether the development of the program was controlled by the staff or whether it was controlled by the teachers. It also measured whether the motivation for learning came from the staff or the teachers. At the start, the teachers thought the sessions were slightly more staff directed than teacher directed and as the work progressed they perceived that the sessions were slightly more teacher directed. The participants showed some constant preference for more control by teachers.

Figure 5-4 is strictly an evaluative item that measured whether the teachers considered what was learned either not worthwhile or extremely worthwhile. The comparison for this graph and the following one is between what actually happened versus what the teacher expected to happen. It can be seen that in general the teachers considered the workshop worthwhile and becoming more worthwhile each succeeding week with the exception of the last week of administrative details. Their expectations were that the workshop would be worthwhile.

Figure 5-5 refers to the quality of communications between staff and teachers. The teachers were asked to rate how well they felt the staff had understood their ideas. The teachers felt that their ideas were usually understood by the staff. The third week shows a sudden drop in this trend.

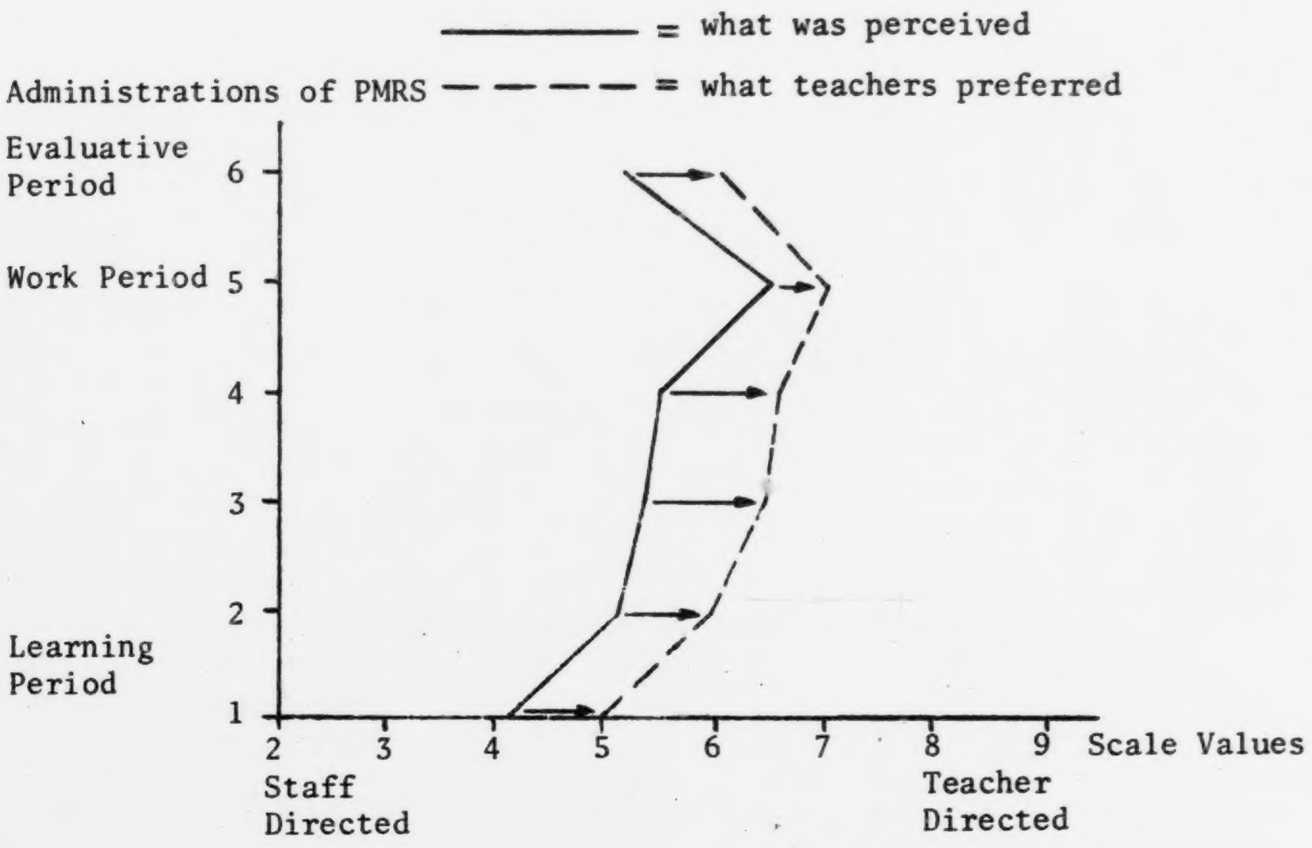


Figure 5-3.--Teacher perceptions and preferences--Staff Directed-Teacher Directed.

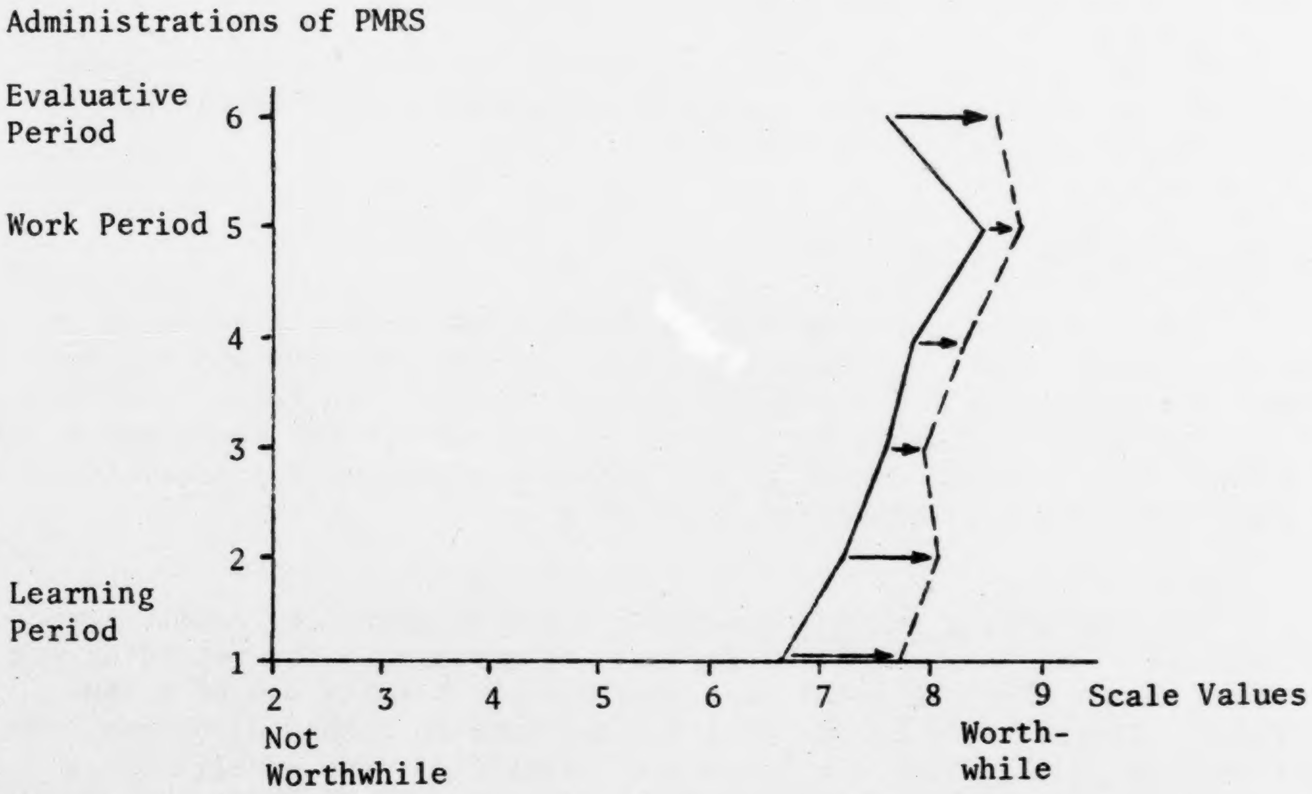


Figure 5-4.--Teacher perceptions and preferences--Not Worthwhile-Worthwhile.

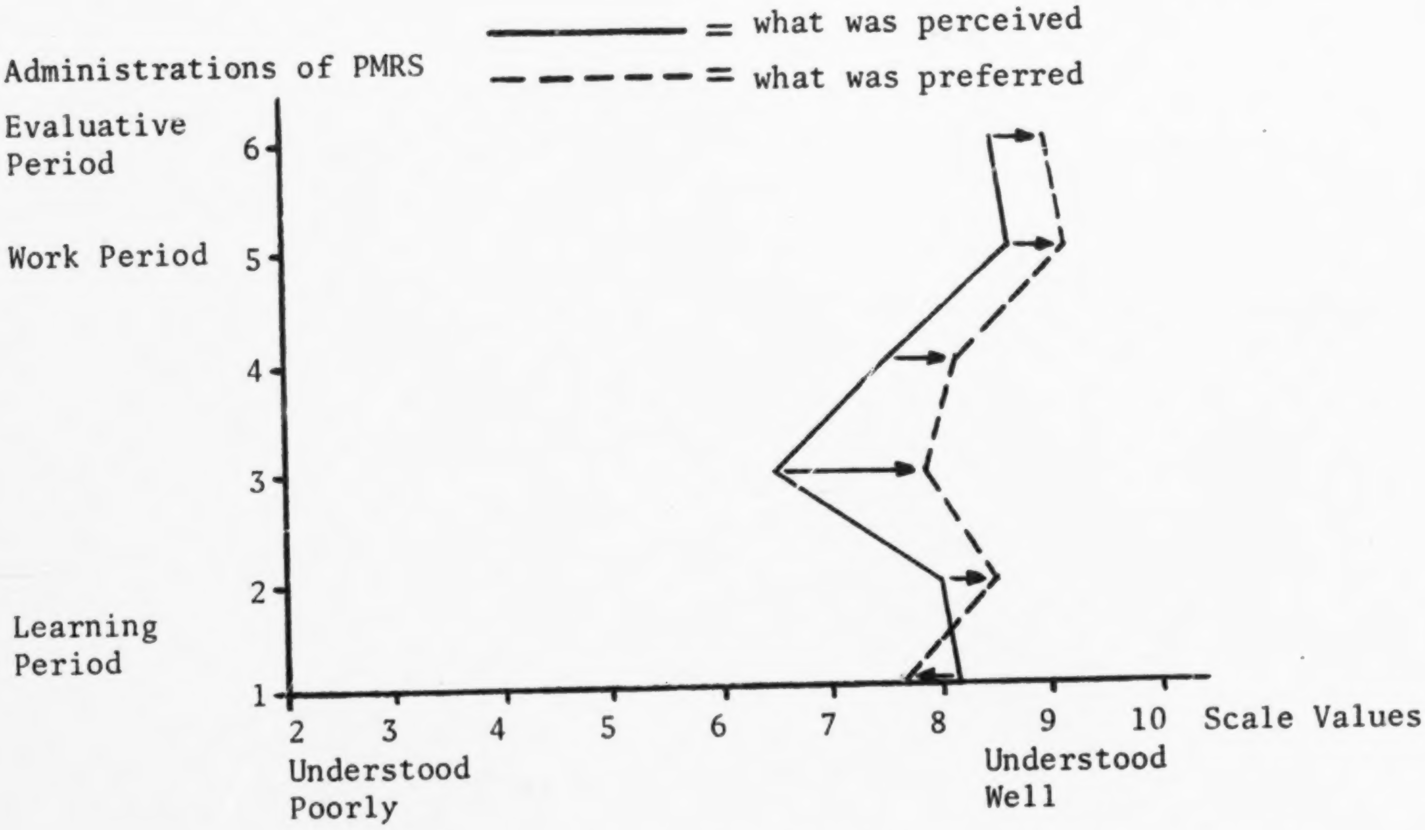


Figure 5-5.--Teacher perceptions and preferences--Understood Poorly-Understood Well.

This drop may be associated with a presentation on behavioral objectives by persons who were not on the regular inservice staff. It could be that the teachers "resented" their presence as an intrusion.

The PMRS data suggest that most of the teachers saw the training program as practical, informal, worthwhile, and becoming increasingly directed by the participating teachers.

Interaction Analysis Data

Verbal communication in the sample of classrooms was recorded on a stereo magnetic tape recorder, one channel for the teacher and a second channel for the pupils. These voice recordings were then taken to a "coding factory" where a team of trained coders listened to the tapes and coded the verbal communication directly into computer storage. The schedule of the field recordings is presented in Table 5-2.

Voice recording equipment:--Three complete recording outfits were each mounted on a two wheel dolly for ease of movement. The recording was made on an Ampex Micro 50 model tape recorder which makes use of a tape cartridge. Stereo could be recorded for one hour in either direction. We might note in passing that the 120-minute cartridges were unreliable in that about five to eight percent would become jammed and tangle the tape

TABLE 5-2

DATES OF CLASSROOM RECORDINGS

Group-type	Pre	Post	Final
Experimental Baseline	12/4 to 1/13	3/21 to 4/17	
Experimental Lessons A & B	12/6 to 1/13	3/19 to 4/16	4/29 to 5/14
Control Baseline	12/6 to 1/28	4/15 to 4/24	

when exposed to fast forward and fast reverse tape recorder modes--the fault seemed to be with the cartridges, not the tape recorders.

One channel was connected to an FM receiver which, in turn, received signals from a wireless FM microphone worn by the teacher. This made it possible to have a microphone about six inches from the teacher's lips at all times. The volume control on this channel could be set quite low which gave a good signal to noise ratio. Another unexpected advantage was that this same microphone picked up the voice of a pupil very well when the teacher bent over or stood near to a single child.

A second channel was connected to a two-channel microphone mixer. In turn the mixer was connected by low impedence cables to two Electro-Voice 644 "sound spot" microphones. These microphones are highly directional due to their mechanical design which resembles a Buck Rogers space gun. By aiming the microphone to each side of the classroom the operator could cut the noisy side or pick up the volume on the side with a pupil speaking. The 644's were on heavy microphone stands which sometimes picked up the vibrations from the motors in air conditioning equipment or the feet of children outside in the hall.

In general, the wireless microphone gave us excellent recording of the teacher's voice and also the voice of a pupil with whom the teacher might be conferring. The classroom system was not working as well as it might. The poor accoustics and residual noise level of a classroom present almost insurmountable problems which can be solved only when the distance between the microphone and the lips of any pupil is small. Ironically, the more elaborate and expensive classroom equipment merely recorded the unwanted noises more accurately, along with the pupils' voices.

Those who operated the equipment were given special training in procedures which were designed to get equipment into and out of classrooms quickly, to mollify nervous teachers, and to avoid upsetting the class as much as possible. This training was helpful, but should not mislead the reader. Taking our equipment into a classroom was about as inconspicuous as taking in an elephant. Incidently, it would be interesting to wire a classroom secretly for voice recording and then measure the average noise level for a few days. From this baseline, it would then be possible to see what happened to classroom noise when equipment such as ours was then brought into the room.

The coding factory and consensus coding:--The FGESS Coding System was used to categorize the interaction which was played back from the voice sound recordings. Ned A. Flanders and Larry Gess developed the twenty-nine category FGESS Coding System (see Table 5-3), which is a modification of Flanders' (1965) basic ten categories. This system was used to code over two hundred hours of verbal interaction. Thirteen people were employed as observers. Each received approximately thirty hours of training before he began coding research data.

A consensus coding procedure was used to categorize the data. Each member of a two-man team had "a box" before him. The boxes had push buttons on top which were connected to a small computer. In addition to ten buttons which were for arabic category numbers, there were three signal lights and a brake. Each observer was instructed to make two button presses when he heard a transition from one category to another. The first button press was to indicate the main Flanders category, from one to ten, to which he had judged that the interaction belonged. The second button press was to indicate the subcategory selected as shown in Table 5-3.

A computer was monitoring the button presses of the two observers. If the two observers' button presses were identical, the tally was stored in the computer's memory. If the two observers disagreed, the button presses were stored in the computer's memory in a special format so that they could be identified. The computer was also programmed to stop an internal clock, to stop the playback tape recorder, and to signal the observers that they had disagreed. The observers then discussed the interaction they had just observed and decided upon a consensus tally. One of the two observers made the required two button presses to indicate the consensus tally. At this time the consensus tally would be stored in the computer's memory, and the computer would again start its internal clock and the playback recorder. The computer clock was used to measure the time from the initiation of one tally to the initiation of the next tally. The initiation of a tally was the point at which either of the two observers initiated his first button press to indicate a transition from one category to another.

In the past, an observer who uses Flanders' coding scheme made a tally once every three seconds. The purpose of this practice was not only to represent changes in interaction, but also to represent how time was used during the coded period. Short interchanges were either ignored or subjectively represented in the pattern of the coded data. Programming the computer in the FGESS system to store the time from initiation to initiation to the nearest tenth of a second enabled the observers to code a segment of interaction which lasted only one-half of a second. This practice of having observers press a button to indicate a transition freed the observers from having to pace themselves.

Consensus coding of data takes much longer than does coding by a

TABLE 5-3

THE FGESS CODING SYSTEM

Category	Subcategories and Explanations
	TEACHER BEHAVIORS
1. Accepts Feelings:	The teacher must include the emotional or mental state of a student or a group of students into his verbal statement or the teacher apologizes to a student or a group of students.
2. Praise or Encouragement:	(1) Simple Encouragement: The teacher calls on a student who is initiating, he produces a statement which indicates that a student should continue his behavior, or he interjects humor that is not at the expense of a student. (2) Simple Praise: The teacher indicates that the student's behavior is correct and acceptable or indicates that the student's behavior has positive quality. (3) Expanded Praise or Encouragement: The teacher makes a statement about his praise or encouragement. Generally he would be explaining the reasons for his praise or encouragement.
3. Uses Student's Statement or Behavior:	(1) Superficial: The teacher repeats or rephrases a student's statement or reports a behavior that has been performed by a student. (2) Responding: The teacher answers a student's question or makes a neutral comment about a student's statement or behavior. (3) Questioning: The teacher asks a student a question which is based on a statement or behavior made by that student or another student. (4) Elaboration: The teacher uses the student's statement or behavior to develop his own statement. The teacher would generally be clarifying or elaborating the student's statement.

TABLE 5-3--Continued

Category	Subcategories and Explanations
4. Asks Questions:	(1) Narrow: The teacher asks a question to which there is probably only one response acceptable to the teacher.
	(2) Broad: The teacher asks a question to which there are two or more acceptable or correct responses. The questions are generally either thought-provoking or require expression of opinion or feelings.
5. Lecturing:	The teacher states facts, his opinions, or his own ideas; he asks rhetorical questions; or he reads to the students.
6. Commands or Directions:	(1) Command: The teacher gives an order to which a student or a group of students are expected to physically comply immediately.
	(2) Direction: The teacher states how a task will be performed in the future.
	(3) Rationale: The teacher states the reason or logic for a direction or a command. The statement does not imply criticism.
7. Corrective Feedback:	(1) Correcting: The teacher corrects a student's response or states in a factual manner the inappropriateness of a student's behavior.
	(2) Interrupting: The teacher interrupts a student's statement for a purpose other than to praise, to encourage, or to use the student's statement.
	(3) Criticizing: The teacher expresses disapproval of the student or his behavior.
	(4) Justifying Authority: The teacher makes a statement which defends his exercising control over the students.

TABLE 5-3--Continued

Category	Subcategories and Explanations
	STUDENT BEHAVIORS
8. Response:	(1) Factual: The teacher has elicited the response and the student is stating facts, citing a source, or summarizing previous statements. (2) Non-factual: The teacher has elicited the response and the student is expressing his own ideas, opinions, or feelings. (3) Refusal: The teacher has elicited the response and the student is expressing that he cannot or will not respond. (4) Reading: The student is reading from printed or written material.
9. Initiation:	(1) Factual: The student is voluntarily stating facts or citing a source. The teacher may have given the student an opportunity to talk but the teacher has not elicited the statement. (2) Non-factual: The student is voluntarily stating his own ideas, opinions, or feelings. (3) Irrelevant or Rebellious: The student is making a statement completely unrelated to the activity in the classroom or making a statement which is uncooperative and rebellious.
	NO EFFECTIVE INTERACTION BETWEEN TEACHER AND STUDENTS
10. Silence, Confusion, and Non-relevant:	(1) Silence: A period of no communication. (2) Confusion: A period of time which cannot be categorized by the observer because many people are talking or the noise level in the classroom prevents the coder from hearing the interaction. (3) Mechanical: A period of time for which the quality of taping makes categorization impossible. (4) Non-relevant: A period of time for which there is no interaction useful to coding outcomes. The teacher will generally be talking to a person who is not a class member, such as a visit from another teacher.

single observer in a classroom. The added time is expended during the period in which the two observers are arriving at a consensus tally after disagreement. The observers can have the tape re-wound and listen to a segment of interaction as often as necessary. Discussion of the segment can last a number of minutes. Yet this practice is very important. An observer is provided with immediate feedback on a disputed tally, and the accuracy of the data is enhanced.

Consensus coding is expensive. All interaction must be coded by at least two observers. Real-time on a computer must be available. The coding takes longer than it would if the observers were in the classroom. All interaction must be recorded magnetically before the coding is done. In spite of the expense, members of Flanders' research staff believe the added cost is rewarded with more accurate interaction data. An added bonus is that consensus coding provides data on observer behavior which has never been available before this practice was instituted.

The reliability of coding using the FGESS consensus method is a very complicated topic. For example, intra-observer reliability can refer to the proportion of initial tallies which agree with consensus tallies. Inter-observer reliability could then refer to agreement between observers on initial tallies and on cleaned up consensus tallies. Interteam reliability would be based on the final coding (team product) of one team compared with another. In addition to these different points of departure, we should remember that the reliability of the score which is an interaction analysis variable, such as an i/i+d ratio, may be quite different than the more traditional observer reliability coefficients. By this is meant that the standard error of category frequencies may be quite different from the standard error of the i/i+d ratio. For what they are worth, inter-team reliability on this project ranged from .69 to .81, with an average of .76. This is quite remarkable when the number of categories is taken into consideration.

Interaction variables:--The coding factory produces tabulated matrices which are quite different compared with conventional coding. The difference is due to a radical change in what is meant by a tally. In conventional coding a single mark is made for a short segment of time that is approximately three seconds long. The sequence pairs are all equivalent, no matter whether they are transitions or whether they are steady state. Consensus team coding directly into a computer produces a different kind of record because the basic unit is changed. The computer counts the time spent in any category to the nearest tenth of a second. Transitions from one category to another are almost instantaneous and of the order of microseconds. Give or take a little, about 10,000 transitions might actually occupy the elapsed time of one second. A matrix of transitions can be tabulated which is a display of the transitions, but the column totals do not correspond to the amount of elapsed time in each category and the steady state cell frequencies would be artifacts of the computer clean-up program. A second or third type of matrix can be printed which does show elapsed time, but it is a special case of "moving into" or "moving out of" particular categories.

In this project report, the following conventions are applied primarily to simplify the analysis of the interaction data. First, all data are collapsed back into the ten categories of the FIAC system. Second, ten variables will be used in most comparisons between groups of experimental teachers and between the experimental group and the control group. The list of ten variables is shown in Table 5-4. These variables can be roughly divided into three kinds. First, variables 1, 3, 4, 6, 7, and 10 quantify some aspect of indirectness on the part of the teacher. Second, variables 2 and 4 are attempts to quantify variation in the balance of direct and indirect patterns. Third, variables 8 and 9 are measures of pupil initiation even though rebellion may indicate some kind of discipline problem.

The Results of the Inservice Training

The material in this section will be organized in terms of questions which can be asked about the effects of the inservice training. First, after inservice training did the experimental teachers act differently when they taught regular academic subjects compared with what we would expect by studying the control group? Second, what relationships can be seen between the inservice training and the kinds of changes taking place in lessons A and B? Third, can we expect the teachers of lower socio-economic children to make changes which are the same as those that are made by teachers of middle class children?

Comparisons Between the Experimental and Control Groups

The data to be considered in this section are called baseline data because they refer to the regular teaching of academic subjects. Except for the presence of the recording equipment and the staff members in the classroom, there was no attempt to influence what was taught or how it was taught. This is in contrast with lessons A and B which are discussed in the next section.

Analysis of covariance with two groups:--Our approach to the problem of comparing the teachers in the experimental group with those in the control group is a simple 2 X 2 analysis of covariance. A covariance analysis is desirable because we are interested in how scores changed, pretraining versus posttraining conditions, and we have no reason to expect that the control group initial scores are equal to those of the experimental group.

The pretraining scores, posttraining scores, and the posttraining scores adjusted by the pretraining scores are shown in Table 5-5, along with some standard deviations. The F test and its associated "p" value, in the two right hand columns, refer to the analysis of covariance. One can read the test of significance as follows--after adjusting the posttraining means of the experimental and control groups on the basis of

TABLE 5-4

INTERACTION VARIABLES INVESTIGATED

Number	Nature of Variable
1	Rosenshine Ratio $\frac{(3-3)}{(3-3)+(7-7)}$
2	Miller Flexibility Ratio (MFR) $\frac{(4-3)+(5-3)+(8-3)+(3-4)+(3-5)+(4-9)+(9-4)+(9-5)}{\text{Total Number of Tallies}}$
3	i/i+d ratio, based on transition frequencies $\frac{1+2+3}{1+2+3+6+7}$
4	Expansive Activity $\frac{1+2+3}{\text{Total Number of Tallies}}$
5	TVRR--Teacher Verbal Response Ratio--after Miller $\frac{(2-3)+(3-3)+(3-4)+(3-5)+(4-3)+(5-3)+(8-3)+(9-3)}{(5-5)+(8-5)+(8-4)+(9-4)+(9-5)}$
6	Sustained Acceptance $\frac{(3-3)}{\text{Total Number of Tallies}}$
7	Immediate Responsiveness $\frac{(8-1)+(8-2)+(8-3)+(9-1)+(9-2)+(9-3)}{\text{Total Number of Tallies}}$
8	Student Initiated Talk Ratio $\frac{9}{8+9}$
9	Rebellion $\frac{(6-9)+(7-9)}{\text{Total Number of Tallies}}$
10	i/i+d ratio, based on real time spent in categories. (formula same as variable 3 above)

their respective pretraining performance, what are the odds that the difference between the two means is due to chance? Our answer to this question is that these odds are quite small on variables 7 and 3. We can infer from these two tests that the experimental group of 19 teachers tended to

TABLE 5-5

EXPERIMENTAL AND CONTROL GROUP COMPARISONS ON TEN VARIABLES

Variable Number	Group	Pretraining		Posttraining		ANCOVA Adjusted Means	T	p
		Mean	S.D.	Mean	S.D.			
1	Experiment Control	0.92 0.87	0.14 0.16	0.94 0.92	0.12 0.09	0.94 0.91	0.38	N.S.
2	Experiment Control	0.16 0.17	0.05 0.04	0.18 0.15	0.06 0.05	0.18 0.15	3.72	$0.05<p$ $p<0.10$
3	Experiment Control	0.70 0.68	0.13 0.07	0.73 0.63	0.12 0.13	0.73 0.64	4.26	$p<0.05$
4	Experiment Control	0.24 0.26	0.07 0.05	0.25 0.22	0.05 0.06	0.25 0.22	3.97	$0.05<p$ $p<0.10$
5	Experiment Control	5.98 6.16	5.75 5.13	4.57 5.52	2.35 2.83	4.58 5.50	1.07	N.S.
6	Experiment Control	0.02 0.03	0.01 0.01	0.02 0.02	0.01 0.01	0.02 0.02	0.01	N.S.
7	Experiment Control	0.15 0.16	0.04 0.02	0.17 0.14	0.04 0.03	0.17 0.14	6.53	$p<0.025$
8	Experiment Control	0.18 0.26	0.16 0.20	0.26 0.30	0.18 0.21	0.28 0.26	0.15	N.S.
9	Experiment Control	0.00 0.01	0.01 0.01	0.01 0.01	0.01 0.01	0.01 0.01	0.58	N.S.
10	Experiment Control	0.63 0.62	0.15 0.09	0.67 0.60	0.15 0.13	0.67 0.60	2.00	N.S.

become more indirect than we would expect from observing the control group of 13 teachers.

It is clear in Table 5-5 that we are having difficulties with some of our variables. Notice how small variables 9 and 7 are. Note, also, that the standard deviation of variable 5 just about equals its mean for pretraining. Apparently the incidence of events in the (3-3) cell (see variable 6) and the (6-9) and (7-9) cells (see variable 9) is very low. One might also guess that a few teachers scored very high on the TVRR causing the standard deviation to become large.

In general, the results are disappointing. One might hope that the data would reflect differences in teaching behavior more dramatically. In working with these teachers and watching them conduct experiments with their own teaching, members of our staff gained the impression that the teachers were learning new skills and that these new skills would appear in the interaction variables. We decided to look more closely at the data.

Linear trend and high-low contrast:--It seemed quite possible that our experimental group and the control group each might not be as homogeneous as we would like. For example, we kept a record of the number of self-directed inquiry projects carried out by each teacher and a rating score for each project. These scores were weighted so that more ambitious, complex tasks received more points than a project which had only a simple training function. A more complex inquiry task would not only involve a change in teaching behavior and evidence from the observer that such a change did take place, but it would include an analysis of the effect of this change on some index of pupil participation. A low level, simple project would be a report in which a teacher indicated that he went into another teacher's room to practice coding. By splitting these weighted scores at the median, we identified nine teachers whom we called hard-working and ten teachers whom we called not so hardworking. An analysis of a variable would give us more confidence in the evaluation of the inservice training when the scores for the hard working group were logically different from the not so hardworking.

We also discussed the fact that five of our control teachers taught in a building which also housed a team of experimental teachers. We had no specific information about contacts between experimental and control teachers, but the possibility existed that experimental teachers might discuss the inservice training activities with control teachers. Even if such discussions did not take place, it was possible that the atmosphere of experimentation might have created a Hawthorne Effect. We decided, therefore, that we could divide the control group into a group of five that might be contaminated, leaving an uncontaminated group of eight teachers.

Given an interaction variable, such as i/i+d or indirectness, we would expect a logical effect from the training activities such that we could rank order the four groups: first would be the hard-working experimental, second the not so hard-working experimental, third the contaminated control, and fourth the uncontaminated control. In Chapter 7, section 7.6, in Statistical Principles in Experimental Design, (McGraw-Hill, 1962), B.J. Winer discusses a "test for linear trend" and for "high-low contrast". A statistical procedure of this sort seemed custom built for our analysis of four groups. We could predict a rank order and we would expect the strongest contrast between group 1, the hard-working experimental, and group 4, the uncontaminated control.

The data from this kind of analysis is shown in Table 5-6. The mean scores, shown for variables 2, 3, 4, 7, and 10, are posttraining average scores adjusted for pretraining performance through analysis of

TABLE 5-6

LINEAR TREND AND CONTRAST OF THE EXPERIMENTAL AND CONTROL GROUPS

Comparison		Interaction Variable Number				
		2	3	4	7	10
Group[b]	1 Mean	0.19	0.76	0.26	0.18	0.71
	2 Mean	0.18	0.70	0.25	0.17	0.64
	3 Mean	0.13	0.66	0.23	0.15	0.61
	4 Mean	0.16	0.62	0.21	0.14	0.59
Linear Trend	t	1.65	2.09	2.00	2.84	2.23
	p[a]	$0.05<p<0.10$	<0.03	<0.05	<0.005	<0.025
High-Low Contrast	t	1.11	2.04	1.48	2.60	1.73
	p[a]	N.S.	<0.04	$0.05<p<0.10$	<0.01	<0.05

[a] All "p" values for a one-tailed test.

[b] Group 1 = hard-working; 2 = not so hard-working; 3 = contaminated control; and 4 = uncontaminated control.

covariance. The results of testing for linear trend and high-low contrast are shown in the bottom two rows. No tests were made for variables 1, 5, 6, 8, and 9 because non-significant results could be expected by inspection.

The major inference to be made from the data in Table 5-6 is that the experimental group became more indirect than the control group when the pretraining and posttraining scores are analyzed. However, the demonstration of this expected outcome is now more convincing. Variables 3 and 10 are both i/i+d ratios, with three based on the incidence of transitions and ten based on elapsed time in a particular category. Variable 7 refers to the teacher's tendency to provide an indirect response at the moment a pupil stops talking. Variable 4 is the general proportion of all indirect statements started to all the transition tallies.

Discussion of experimental and control group comparisons:--Thus far our analysis has shown that the nineteen teachers who participated in an inservice training program did make changes in their classroom interaction and these changes were in a direction that was expected. A direction, incidently, which has been demonstrated by many other researchers. We have shown that these changes are logically distributed within four groups which could be rank ordered in terms of being influenced by the training activities. The staff is disposed to conclude that the inservice training activities did influence the teaching behavior of the participating teachers which is little enough satisfaction considered the time and effort involved. It is now time to turn to classroom discussion lessons A and B in order to describe what kind of changes are occurring in the classroom taught by experimental teachers.

The Analysis of Specified Lessons A and B

In this section we can turn to pretraining, posttraining, and final classroom observations for those teachers who are in the experimental group. Lesson A was a 40 to 50-minute discussion about a topic which had moral overtones (good versus bad), in which the teacher attempted to encourage the expression of pupil opinion, and to summarize at the end. Lesson B was designed to stimulate inductive reasoning. The teacher was trying to have pupils make generalizations about a specific topic. In order to reach these generalizations the teacher would be expected to take a more active part.

In the discussion to follow, we must keep in mind that no comparisons between the experimental and control teachers are possible. The statistical comparisons are contrasts between the two types of lessons and the three occasions that they were taught, namely, pre, post, and final. Since the inferences to be reached are essentially descriptive, each variable will be dealt with separately and on a subjective basis.

Variable One:--The original meaning of the ratio (3-3)/(3-3) + (7-7) has been radically changed in this project because of the coding factory. The original meaning was established by the convention of recording one code symbol about every three seconds. With this procedure it was possible to record a long string of "3s" or "7s" providing such statements were made by the teacher. With the coding factory, the "3" pushbutton is depressed as soon as a teacher starts to three and there the button remains until another category button is depressed. With a coding factory, there is no such thing as a 3-3 sequence pair.

When the data from a coding factory are reduced from the 29 categories of the FGESS system to the ten categories of the FIAC system, all transitions from one subscript of Category Three to another subscript of Category Three are counted in the (3-3) cell of the matrix. The same procedure occurs with Category Seven. Thus, in the present study, the ratio of variable one is totally dependent on the number of transitions among the subscripts of the two categories involved and is not determined by sustained type three and seven statements.

Within the above restrictions, the pre, post, and final scores for lessons A and B are shown in Figure 5-6. There are no significant differences between A and B. Both the post and the final means differ from the pretraining mean at a chance probability of 0.05 or less. The psychological significance of these differences is probably inconsequential because the incidence of the transitions in the ratio is extremely low. Too low to be of much use in understanding the differences between lessons A and B, or differences between the three assessments.

Variable Two:--The Miller Flexibility Ratio (MFR) is a variable which should produce higher scores the more a teacher shifts back and forth between indirect and direct patterns of influence. The ratio is based on the transition matrix from the coding factory, not an elapsed time matrix. Thus, the longer a particular interaction mode is sustained, such as indirect or direct, without shifting back and forth, the lower the MFR should be.

The differences which are illustrated in Figure 5-7, to the right, appear to be and are, in fact, larger than would be expected by chance, both for the differences between A and B as well as the differences for the final mean and both pre and post means. When teaching a B type lesson, the experimental teachers show fairly regular growth in the three assessments. With a Type A lesson, this growth appears between post and final measures. This variation seems less interpretable than the consistent increase of lesson B. Shifting back and forth between indirect and direct patterns of interaction appears to increase and is highest at the final assessment. This occurs more often when the lesson requires a more active participation by the teacher as in lesson B.

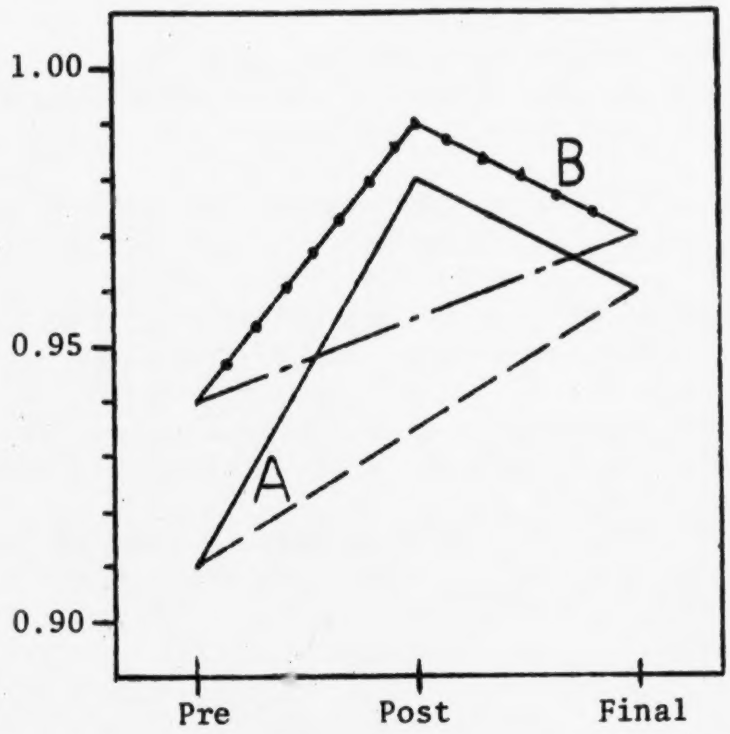


Figure 5-6.--Variable 1.

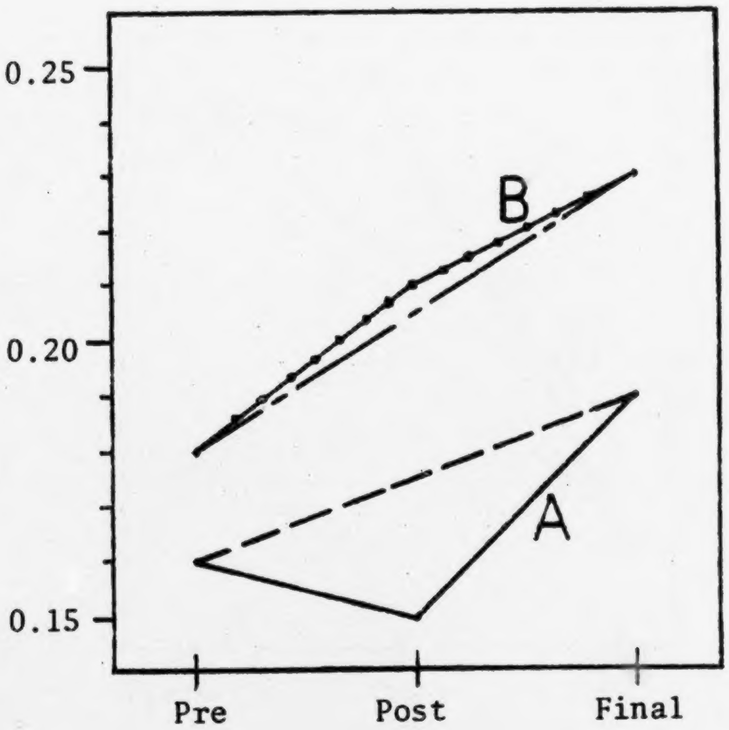


Figure 5-7.--Variable 2.

Variables Three and Ten:--These two variables are both based on i/i+d ratios and have been discussed in earlier chapters. It is the coding factory with its computer assisted coding that provides the two ways to quantify this ratio. Variable 3 is based on the transition matrix. A tally in this matrix occurs whenever there is a change in the category. The frequencies in this matrix are not related to controlled time units or to a regular tempo of recording. Variable 10 is based on a "real time" matrix in which cell frequencies represent tenths of a second, that is, a regular time unit. In a real time matrix, the number in the (3-5) cell represents the amount of time spent in Category Five on those occasions at which Five was preceded by Three.

There were significant differences for both of these variables when the baseline data for the experimental group are compared with those of the control group. Given these significant differences, our purpose now is to analyze the changes in lessons A and B in order to reach inferences about the changes which the experimental group must have made. There are no significant differences between the two lessons, but there are significant differences between pre, post, and final observations. These differences can be seen in Figures 5-8 and 5-9. For variable 10, the largest gains are between post and final measures. For variable 3, the largest gains are between the pre and post measures. There is one *post hoc* explanation which seems quite attractive. Suppose that for our teachers the immediate impact of the inservice training was to react more often to the ideas expressed by boys and girls. This would result in a higher incidence of Category 3 type statements shown in Figure 5-8. At the final assessment, the incidence of Category 3 type statements does not increase significantly (see Figure 5-8), but the amount of time spent in this category does increase, as shown in Figure 5-9. The explanation might be that teachers first try to react to pupil ideas more often, but these reactions are relatively superficial, perhaps merely repeating the words of the pupil. With additional practice, the skill of developing and making use of pupil ideas begins to mature and more time is spent in this activity.

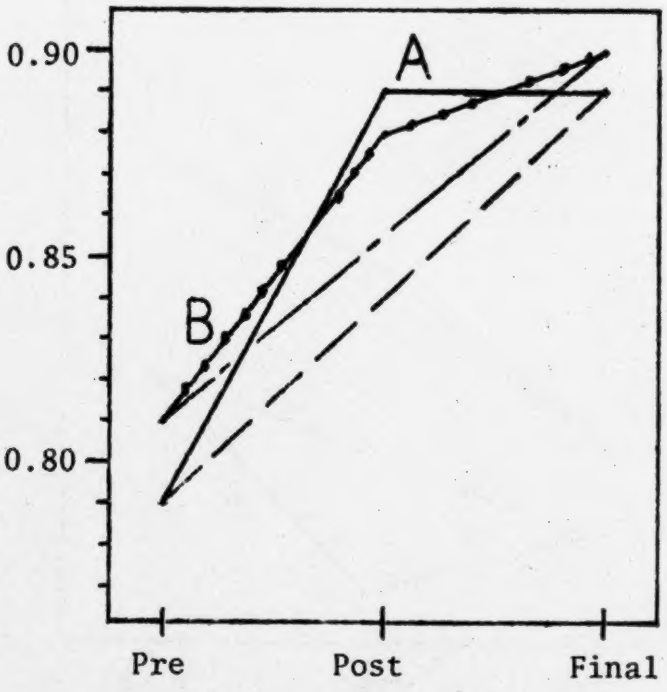


Figure 5-8.--Variable 3.

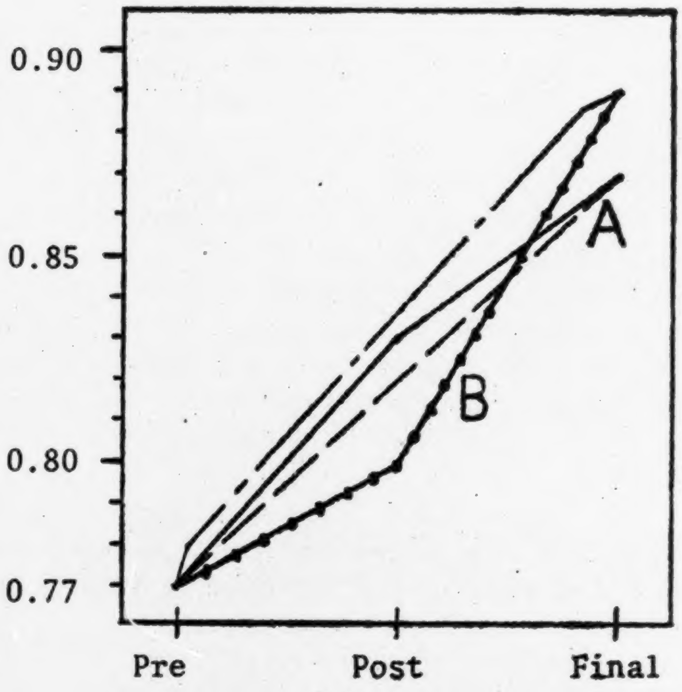


Figure 5-9.--Variable 10.

As far as the non-significant differences between the A and B lessons are concerned, it does seem reasonable that the initial increase in this skill appears to be higher for the A type lesson in which boys and girly are encouraged to express their own ideas. However, with continued practice this skill does appear in a more content oriented lesson. Perhaps the latter performance is more difficult and takes more practice.

Variable Four:--Variable Four is another measure of teacher indirectness which increases in association with training, but holds steady or decreases after training. Increasing the incidence of transitions involving Categories 1, 2, and 3 again appears easier in lesson A, although the differences between lesson A and B are not statistically significant. Just why the gains made in lesson B interaction return to their original level is unknown. See Figure 5-10.

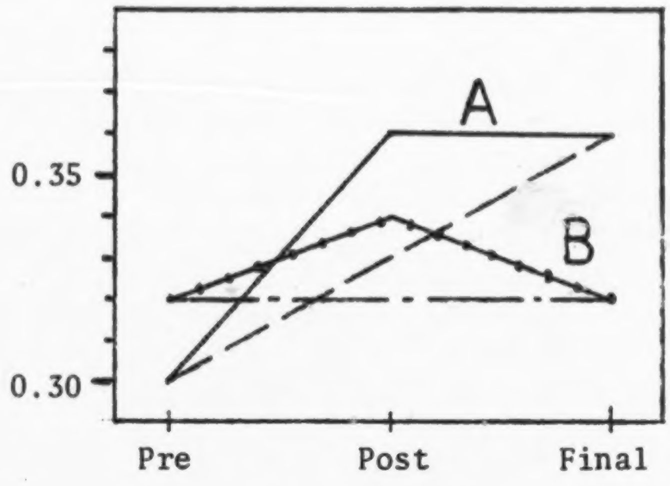


Figure 5-10.--Variable 4.

Variable Five:--The teacher verbal reinforcement ratio, first developed by Miller (1969), provides us with the only significant interaction effect. Apparently the teachers in our sample distinguish between lessons A and B in terms of how they will manage their verbal reinforcement. In association with training, verbal reinforcement increases dramatically in the A type lessons and decreases almost as dramatically in the B type lessons, as shown in Figure 5-11.

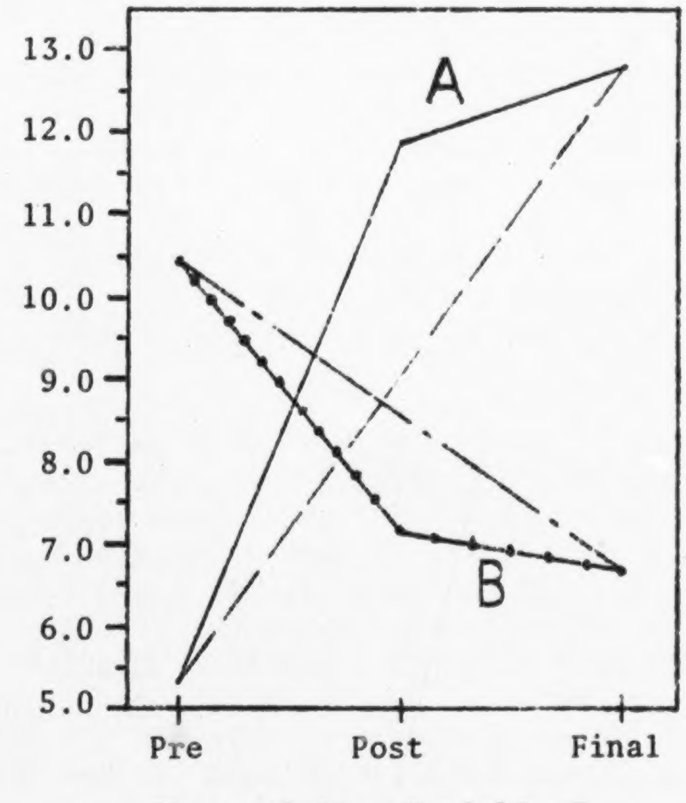


Figure 5-11.--Variable 5.

This variable is quantified by using data from a transition matrix, rather than a real time matrix which Miller originally used to calculate the ratio. Thus, the mean scores on the TVRR in this project are higher than those reported in Miller's project. In this project, the numerator involves transitions to or from Category 3 and the denominator involves transitions to lecturing and asking questions. The explanation for the significant interaction must be that lecturing and question asking increase for B type lessons and decrease for A type lessons. Associating any variation with the denominator would appear to be a better guess than the numerator since we already know that transitions involving Category 3 are probably increasing, rather than decreasing, for both types of lessons.

Variables Six and Nine:--While variable six follows five, in numerical order, this discussion of it includes variable nine because the results, conclusions, and inferences are the same for both variables. The results show an extremely low incidence and because of this low incidence, variance is practically nonexistant. Just as in the case of variable one, variable six suffers partly because transition matrices were used. Thus the frequency in the (3-3) cell accounts only for transitions among the subscripted categories of main Category Three. In some lessons this frequency was nearly zero. The same can be said of transitions within the (6-9) and (7-9) cells. With such low incidence there are no significant differences between lessons A and B and no significant differences from pre to post to final. Since these are the main features of these two variables no graph is used to illustrate the results.

Variable Seven:--This variable is concerned with the incidence of teacher encouragement and reinforcement at the moment a pupil stops talking. We expect this variable to follow the general trend of variables three and ten and, in this particular case, the results turn out as expected. There is not significant difference between lessons A and B. There are significant differences between pre and post and pre and final and these features show clearly in Figure 5-12, providing one assumes that the variance is small in proportion to the changes, which it is.

If a consistent relationship between the immediate response of the teacher and the i/i+d ratios did not occur, one might have serious reservations about consistency between variables.

Variable Eight:--This variable, along with variable two, reveals a significant difference between lessons A and B. Just as teacher flexibility is higher for the type B lessons compared with A, pupil initiation is higher during lessons A compared with B. The difference is shown in Figure 5-13. A reduction in pupil initiated talk during the B type lessons is consistent with both variables 5 and 2. In this case, it is the incidence of pupil initiation "starts" that is being measured by a transition matrix. Pupils will start to initiate more often in the open type A lessons and less often in the more structured type B lessons. Another way this can be said is that the proportion of pupil statements in response to the teacher is increasing in the type B lessons and decreasing in the A lessons.

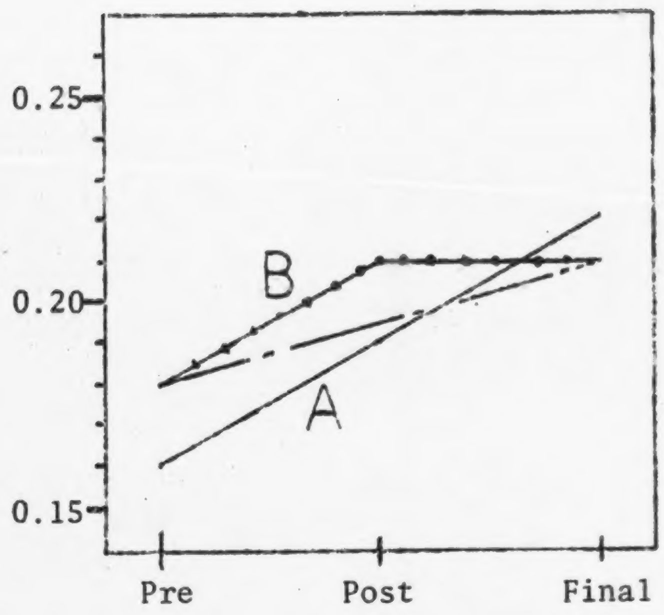


Figure 5-12.--Variable 7.

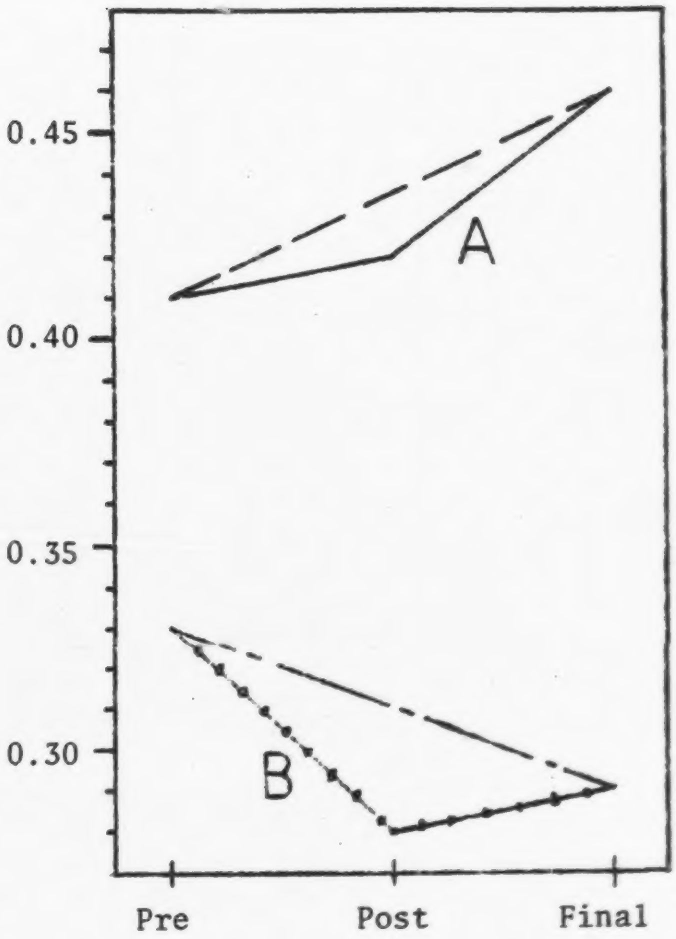


Figure 5-13.--Variable 8.

Summary of lessons A and B:--The differences between lessons A and B are infrequent and logically related to the intended differences of the two lesson plans. Flexibility increased, but more in lesson B situations, shown by variable two. The teacher's reinforcement increased for lesson A and decreased for lesson B, as shown by variable five. The proportion of pupil statements which were initiated, compared with all pupil statements, was higher and increasing for lesson A, smaller and decreasing for lesson B, as shown by variable eight.

The evidence of growth for teachers in the experimental group in terms of becoming more indirect is shown by changes in variables three, four, seven, and ten. In several instances (2, 5A, 7A, 8, & 10) there is evidence of continuing growth between the posttraining evaluation and the final evaluation. As can be seen in Table 5-7, however, this last trend is usually not statistically significant, the exception being variable two. The evidence in Table 5-7 consists of differences between the A and

TABLE 5-7

SUMMARY DATA FOR LESSONS A AND B (Lesson A--N = 17[a]; Lesson B--N = 17[a])

Variable	Differences Between Lessons A & B		Differences Within Lessons Trials--1(pre), 2(post), 3(final)					Between and Within Interaction	
	ANOVA		ANOVA		Newman-Keuls			ANOVA	
	F	p	F	p	p(1&2)	p(1&3)	p(2&3)	F	p
1	0.7991	NS	3.9835	0.0228	< 0.05	< 0.05	NS	0.0765	NS
2	14.0180	0.0010	9.8038	0.0004	NS	< 0.01	<0.05	2.8113	0.0659 NS
3	0.0095	NS	15.8509	0.0000	< 0.01	< 0.01	NS	0.1845	NS
4	0.3669	NS	4.3688	0.0163	< 0.05	< 0.05	NS	1.4995	NS
5	0.2432	NS	0.7008	NS		not performed		3.5099	0.0347
6	0.3538	NS	4.4394	0.0154	< 0.01	NS	NS	1.2713	NS
7	0.2326	NS	17.1739	0.0000	< 0.01	< 0.01	NS	0.8239	NS
8	7.9502	0.0081	0.1931	NS		not performed		0.9544	NS
9	5.8139	0.0206	2.2107	NS		not performed		0.3976	NS
10	0.0058	NS	4.8258	0.0111	NS	< 0.01	NS	0.2815	NS

[a] Two teachers were lost: one through a malfunction of tape recorder; the second because equal Ns were needed for the ANOVA program.

B lessons, shown in the left hand column. Differences between the trials, shown in the second ANOVA column. In the third column, the results of Newman-Keuls tests are shown to see how many specific differences could have been expected by chance. (Reference to the Newman-Keuls test can be found in Chapter 7, Section 7.2 of Winer, B. J. Statistical Principles in Experimental Design. New York: McGraw-Hill, 1962). In the last column to the right, Table 5-7 shows which ANOVA interaction effects were significant. These tests of significance apply to the graphs which can be found on previous pages.

These data show what kinds of changes in classroom interaction were occurring within the experimental group. We know from Table 5-6 that the experimental group differed from the control group by becoming more indirect based on pretraining and posttraining assessments of regular academic subjects. In this section, the comparisons for the experimental group are based on pretraining, posttraining, and final assessments of two lessons. The use of a common lesson plan provided a somewhat more standardized situation, pre to post to final. We note, by way of methodological interest, that as soon as the subject matter and lesson plans are controlled (to the extent we did) that more of the ten variables showed significant differences. This is due to a reduction in unwanted variance.

Changes in Classroom Interaction and Socio-economic Level.

The question which guides what is written in this section asks whether we can expect the same changes in classroom interaction to occur when the schools are located so as to represent different socio-economic levels. Very little is known about differences in classroom interaction which can be expected when the socio-economic level of the school community varies. Even less is known about whether teachers who work daily with children in disadvantaged areas can make changes in their classroom interaction as a result of inservice training programs.

The socio-economic levels in the sample:--There were no systematic, quantitative schedules which were filled out in order to assign a particular class and its teacher to one socio-economic (S.E.) level or another. The field staff did discuss school communities and from these conversations the following characteristics of each level became clear. Four classes were assigned to the lowest level which we called "deprived". The youngsters in these classes lived in communities which had a high proportion of slum areas. General deterioration of property and property values was present. Delinquency and unemployment rates were high. The classification of lower lower class seems accurate.

We identified a second level consisting of six classes which we called "disadvantaged". In these areas one would find a lower proportion of slum conditions, although such conditions were clearly present. These youngsters had very few recreational opportunities which were supervized. Delinquency would be above average, but not the highest. These areas often formed a buffer zone between thw worst slum conditions and middle class areas.

We decided that there were nine schools which were located in an "advantaged" area. Employment would be high in the areas from which these youngsters came. In some cases, a professional or university atmosphere existed. The educational level of parents would vary from extremely high to families in which the parents probably had finished high school. Although some of these communities had social problems like delinquency, failure to vote additional taxes for the schools, etc., the general conditions were better than in our other two groups. We felt that these nine classes existed in middle class communities.

Procedure and analysis of results:--The plan of the analysis is to set up a comparison between groups of experimental classes, divided into the three socio-economic levels, and the uncontaminated control of eight teachers. The socio-economic level of the control teachers is ignored in this analysis. The rationale is that we have shown certain differences between experimental and control teachers by comparing interaction variables based on baseline data. We plan to repeat these comparisons by dividing the experimental teachers into socio-economic levels rather than hardworking and not so hard working. The question is whether the teachers, who are in one of the three levels, show more change, equal change, or less change than those at another level.

The statistical procedure makes use of final adjusted scores on the ten interaction variables which are the product of a covariance analysis. As part of the covariance program, an F-test is used to estimate the odds that the scores from the four groups could be random samples from the same population. The results are shown in Table 5-8. It can be seen that these odds are very poor for variable seven, not very good for variables three and four, and quite acceptable for variables two and ten. One can interpret these results generally by inferring that the teachers at three different socio-economic levels were making similar changes. If one chose to dwell on exceptions, they would be that the teachers in advantaged classrooms are less likely to increase the incidence of immediate indirect responses to pupils and there is a non-significant trend indicating that these same teachers are less likely to increase their i/i+d ratios. Incidently, the visual inspection of scores from variables one, five, six, eight, and nine, not shown in Table 5-8, indicate that any tests of significance would be a waste of time. The most likely candidates for significant differences are the five variables shown in Table 5-8.

By way of review and summary, we begin by noting that experimental teachers tended to become indirect after inservice training, more indirect, for example, than we would expect from studying similar scores from a control group. When the scores of experimental teachers are grouped according to the socio-economic levels of the school community, and final scores are adjusted for initial performance level, there is only one variable, number seven, which reveals significant differences among the four groups in the analysis. In general, we can say that the teachers at all socio-economic levels contributed equally to the changes which were observed in the experimental group.

TABLE 5-8

ADJUSTED CHANGE RELATED TO SOCIO-ECONOMIC LEVEL

Variable Number	Group[a] Letter	Group Means			F	p
		Pre	Post	Adj.		
2 (flexibility)	Advan.	0.17	0.18	0.17	0.62	N.S.
	Disadv.	0.15	0.18	0.19		
	Depri.	0.13	0.18	0.20		
	Control	0.17	0.16	0.16		
3 (i/i+d)	Advan.	0.76	0.71	0.67	2.65	$0.05<p<0.10$
	Disadv.	0.63	0.77	0.80		
	Depri.	0.64	0.72	0.75		
	Control	0.66	0.62	0.63		
4 (Col. 1,2,3)	Advan.	0.27	0.24	0.23	2.43	$0.05<p<0.10$
	Disadv.	0.19	0.25	0.28		
	Depri.	0.27	0.27	0.26		
	Control	0.25	0.21	0.21		
7 (Immediate response)	Advan.	0.17	0.17	0.16	4.17	$0.01<p<0.05$
	Disadv.	0.12	0.16	0.18		
	Depri.	0.14	0.18	0.19		
	Control	0.15	0.14	0.14		
10 (i/i+d)	Advan.	0.70	0.66	0.64	0.80	N.S.
	Disadv.	0.58	0.68	0.70		
	Depri.	0.57	0.68	0.70		
	Control	0.62	0.59	0.60		

[a] Advan. = Advantaged group; Disadv. = Disadvantaged group; Depri. = Deprived group; and Control = Control group.

For those who are disposed to think that a feature of classroom interaction like teacher indirectness would be low at lower socio-economic levels, there are fairly consistent trends in Table 5-8. Notice, for example, that on the pretraining scores the deprived and disadvantaged groups are usually lower than the advantaged group. On adjusted change scores the reverse seems to be true. What may be taking place is that teachers in lower socio-economic areas are in a better position to become more indirect should they choose to do so. They seem to "catch up", so to speak, and thus show higher final scores when these scores are adjusted for initial performance.

Chapter Six

SUMMARY OF THE PROJECT

Review

The purpose of this project, as stated in the abstract, is to test some theoretical principles of teacher influence in the sixth, fourth, and second grade levels with particular emphasis on the patterns of teacher influence which occur in different teaching situations. This purpose involves four objectives. The first objective is to establish normative data for teacher influence patterns at the three grade levels of the elementary classroom by applying the technique of interaction analysis and tabulating the data separately for different teaching situations. This first objective is not covered in this volume of our report. The normative data can be found in Volume II.

The second objective required a comparison between one set of classes, at each grade level, in which pupil attitudes and achievement are above average and another set of classes in which these measures are below average. When the first group is compared with the second, our four hypotheses were--(A) more indirect teacher influence will occur when new material is being introduced and when difficulties are diagnosed; (B) more direct influence will occur at the later stages of classroom learning cycles; (C) more flexible patterns of teacher behavior will occur across different teaching situations; and (D) more indirect influence will occur during all phases of teaching. This book, Volume I, contains an analysis of these four hypotheses.

The third objective, to develop a prototype apparatus for tabulating interaction analysis data directly into matrices, took the form "recording systems" rather than a piece of hardware. We helped to develop remote coding in the classroom connected by telephone lines to a tone operated keypunch. This project was sponsored by the Michigan-Ohio Regional Educational Laboratory. We developed a "coding factory" which has been described in Chapter Five of this volume. Further information about this objective can be secured by writing to the project director.

The fourth objective was to expose teachers to inservice training in an effort to see if analyzing one's own classroom interaction causes teachers to modify their teaching behavior and to see if these changes are associated with the socio-economic level of the community in which the school exists.

The procedures, difficulties, summaries of the data, statistical analyses, and conclusions are described on earlier pages of this volume of the report. Tables of normative data can be found in Volume II of this report. What now follows is a summary of the findings and a discussion of the major conclusions.

Specific Conclusions

Second Grade

The few significant differences which appear in the analyses of the second grade data do not provide a basis for supporting any of the four hypotheses of this project.

A number of new ways to quantify flexibility were tried out in the second grade project. For example, a fairly stable measure is formed by calculating the standard deviation of i/i+d for every 100 tallies. In addition, a measure of flexibility developed by Miller (1969), namely the MFR, was applied to the second grade data. It will take additional applications before the utility of these procedures can be determined.

Fourth Grade

The opportunity to test Hypotheses A and B were fairly good in the fourth grade project. For example, periods of classroom interaction during which old and new materials were introduced could be identified. It was also possible to identify the "latter stages of learning cycles" during the two-week unit of study. Because our hypotheses were tested fairly we can say that there was no support for Hypotheses A and B in our fourth grade sample. This is to say that "current classroom teaching practice" does not follow Hypotheses A and B in our fourth grade sample. It remains possible, however, that the hypothetical relationships stated in these two hypotheses are valid and that they may someday be confirmed when true experiments are conducted. In an experiment, treatment differences can be given greater contrast than generally occurs in a field study.

Both Hypotheses C and D are supported by an analysis of our fourth grade data. Greater flexibility of teaching behavior was positively associated with measures of both achievement and attitude, with achievement alone, but not with attitude alone. In classrooms where boys and girls learn more and like it better, teachers apparently vary their initiation more dramatically (wider swings) that the teachers in the other classrooms. Hypothesis D is confirmed because higher levels of indirectness are associated with higher scores in both attitude and achievement, taken together or singly when all phases of instruction are considered.

The fourth grade coding and observation made use of subscripts of Category 3. It is interesting that the value of "t" is larger for the combined subscripts 31 + 32 than it is for 33 + 34 when classes are separated on a criterion such as achievement or attitude. A "t" value is determined by a fraction: the observed differences appear in the numerator and an estimate of their sampling distribution appears in the denominator. When the difference between the subscripted events is larger, the value of "t" becomes larger. When the estimates of the variances in the numerator become smaller, "t" becomes larger. Thus, we can say that the proportion of difference to variance for the combined subscripts 31 + 32 is larger than it is for 33 + 34. These results would be a little easier to live with if they had been reversed. If the higher ordered subscripts, 33 + 34, had a larger proportion, it would mean that they are more discriminating in this kind of statistical test. Teacher statements which form questions from ideas which pupils suggest and which seek to establish relationships between ideas which have been expressed by pupils should, as a first guess, be more discriminating than merely repeating or acknowledging pupil ideas. Since the trend in our data is the reverse, more questions are raised than are answered.

Sixth Grade

The sixth grade research design did not provide as good an opportunity to test Hypotheses A and B as was true of the fourth grade design. A comparison of i/d ratios when old versus new material was taught, high achieving classes contrasted with low achieving, had only one significant difference and that was for the high-low achieving contrast for new material. Although this is promising, it is far from conclusive. There was no adequate opportunity to compare segments of interaction which occurred early in the cycle of learning compared with later, as required for Hypothesis B.

On the other hand, Hypotheses C and D were both supported by evidence from the sixth grade project. To test Hypothesis C, it was shown that teacher influence was more flexible, as shown by the standard deviation of the i/i+d ratios, as one teaching purpose was compared to another, the high achieving classes compared to the low achieving. It is interesting to note that measures of flexibility have stronger associations with measures of achievement than with measures of positive pupil attitudes. To test Hypothesis D, a variety of analyses were shown. The median split and the top ten versus bottom ten in achievement and/or attitude all showed significant differences on some measure of indirectness such as the i/d ratio. An analysis of variance of the original high, medium, and low classes, selected this way on the basis of the first pupil attitude inventory, showed logical and significant results in support of Hypothesis D.

The sixth grade project provided evidence that average pupil attitudes decrease after the initial assessment. Shortly after the semester starts, pupils either become disillusioned and mark attitude items lower or the lower marks show that the initial assessment was too high, in either case, the average positive pupil attitude scores decrease.

The Regression Analysis

In Chapter Four the results of making an analysis of five different grade levels are reported. Data from two grade levels, the seventh and eighth grades, were added to the sixth, fourth, and second, in order to have more cases for an extended multiple regression analysis.

A factor analysis of 27 interaction variables, one grade level at a time, showed three consistent factors. It was interesting to note that ratios based on "I" and "D" appeared in a factor which was different from ratios based on "i" and "d". This suggests that teacher questioning and lecture components may form a different kind of "indirectness" compared with the teacher responding to pupil ideas and giving directions.

Two multiple regression analyses were made, one with a pool of 27 variables and another with ten variables. The results suggest that the larger pool may very well overestimate relationships. With ten variables the multiple correlation coefficients between interaction variables and an educational outcome, in one case adjusted achievement and the other average pupil attitude, are shown to be quite high; the second grade being the exception.

A fixed predictor equation which represented teacher indirectness was used at all five grade levels. In spite of the differences between grade levels, the results were encouraging except for the second grade. One should certainly expect higher results if the procedure of this step is applied to samples of classrooms which are at the same age level, teaching the same material, and have pupils which are equal in ability.

It is interesting to note, in the analyses at each grade level and especially in the various regression analyses, that associations between most interaction variables and positive pupil attitude scores are higher than associations with measures of achievement adjusted for initial ability. The most consistent exception to the above generalization is the interaction variable of flexibility which is just the opposite. The generally higher associations with attitude measures may be due, in part, to the development of the attitude test itself. Item analysis, during the several years of development, was always based on classrooms which had contrasting high and low i/d ratios. Therefore, items were retained which discriminated on this dimension. Attitude associations might be higher because our tests of achievement were different at each grade level. On the other hand, the test of positive pupil attitudes was almost identical for the different grade levels, the second grade again is the exception.

The Training of Teachers

The inservice training project, reported in Chapter Five, was concerned with helping teachers modify the interaction patterns of their own classes. The training curriculum was based on learning how to conduct five step inquiry projects about one's own teaching, learning how to use interaction analysis, and practicing certain teaching patterns in simulated skill exercizes. It was found that teachers who worked harder in these training experiences were more likely to become indirect when a pretraining assessment was compared to a posttraining assessment. More likely, that is, compared with teachers who did not work as hard. During the period of training, teachers reported that they perceived themselves as becoming more self-directed regarding the inservice training.

An analysis of these changes, made separately for classrooms that were located in communities which were at different socio-economic levels, indicated that change was fairly uniform and independent of socio-economic level. In fact, the data suggest that pretraining measures of a variable like indirectness are likely to be lower for those classes in low socio-economic districts. Apparently these teachers can and do reach levels which are similar to other teachers for the posttraining assessment. Thus, their gain scores adjusted for initial performance may be as high or higher than other teachers. Information about differences in classroom interaction variables across socio-economic levels has not been available as much as we might wish. These data, for sixth grade teachers before and after inservice training, are especially welcome.

Discussion of the Results

This section includes a discussion of the results, organized into four topics. The first discussion is on teaching effectiveness as a field of knowledge. The second is on helping a teacher change his teaching behavior. The third is an outline of the contributions which the project makes for those who conduct research. The fourth and last topic describes some of the contributions of this project for the classroom teacher.

Current Status of Analyzing Classroom Interaction

The results from the second, fourth, and sixth grade levels of this project take on greater significance when viewed in terms of other research projects. Flanders (1970, pp. 390, 410, & 411) has listed 18 projects, including the five that are discussed in this volume, which investigated the proposition that interaction analysis variables are associated with educational outcomes. Depending on how you define an association between interaction and educational outcome, between three to five projects--including the second grade of this report, failed to provide one or another kind of association with either positive pupil attitudes or with achievement. The remaining 13 to 15 projects did support one or another kind of association.

The first association which appears most consistently is that indirectness of the teacher is associated with both achievement and positive pupil attitudes. Here indirectness refers to a higher proportion of teacher response statements rather than teacher initiation statements. A teacher can respond by reacting to pupil ideas, giving encouragement and praise, or by reacting constructively to pupil feelings and attitudes. A teacher can initiate by expressing his own ideas, giving directions, and by criticizing pupils or justifying his own authority. The association which appears most frequently is that the proportion (i/i+d) of teacher response to initiation is higher in classrooms which score higher on positive pupil attitudes and achievement adjusted for initial performance. A higher proportion means that a teacher provides about ten to fifteen percent more statements in Categories 1, 2, and 3. Or, to define it another way, in a class that is below average in achievement or attitude scores, we would expect that the proportion of Categories 1 + 2 + 3 divided by 6 + 7 would be less than 0.4 and that in above average classrooms this same proportion would be greater than 0.4. We might add that in general classroom interaction is teacher dominated and that most teacher influence is directive in all but a very few classrooms.

The second association which appears in four out of five of the projects reported in this volume is that flexibility in the proportion of teacher direct and indirect statements is also associated with achievement scores. This means that the data from one observation of one particular activity can be compared with another observation of a different learning activity for the same teacher and that when this procedure is repeated, variation between observations is likely to be higher in classrooms in which pupils appear to be learning more. In turn, this means that a teacher is more likely to be exerting a different proportion of direct and indirect behavior, one situation compared to another.

The third type of association, which appears only in the original report of the seventh and eighth grade projects, is that we can predict the kind of variation which lies behind flexibility measures. Except for these two projects, educational researchers have had little success in making such predictions, for example, our 4th grade project.

It is now appropriate to indicate what we do not know about classroom interaction. There are very few studies which prove or disprove that particular patterns of teaching behavior cause different educational outcomes to appear. Flanders (1970, pp. 390 & 363) describes four experiments in which teachers purposely acted differently and these differences apparently influenced educational outcomes. In these four experiments it would be difficult, if not impossible, to explain the results on the basis of differences in pupil ability. Therefore, these four experiments show that a teacher can purposely adjust his behavior in ways that influence educational outcomes. Most other studies of interaction analysis are field studies in which "treatment differences" are, in reality, a special grouping of the classes observed. In these field studies an adjustment through analysis of covariance can be made to reduce the effects of initial pupil ability, but such an adjustment does not eliminate all of the effects of pupil ability. Brighter children probably initiate more ideas than slow children. Brighter children can make a teacher appear to be more indirect.

Current Status of Helping Teachers Change Their Behavior

Chapter Five of this volume deals with inservice training. Flanders (1970, p. 351) lists 18 projects which have been concerned with whether training experiences will help teachers modify the interaction patterns which they generate with pupils. In nearly all of these projects, more than 15, the results suggest that when teachers or college students analyze patterns of interaction that they are likely to modify those pattenrs in subsequent teaching performances. In particular, teachers can engage in training which highlights and calls attention to indirect patterns, subsequently these teachers are likely to perform more indirectly.

The particular training experiences which will be most effective in helping a teacher modify his behavior have, by no means, been identified. Among the issues here is the extent to which the training experiences should be set forth in detail and the adult learner expected to follow the steps which are provided. An alternative might be to set only general procedures as guidelines for adult learners and then expect the adult learner to take more responsibility and to show more self-direction in the conduct of his training. It is also not clear just how various forms of simulated training can be used, how microteaching is best integrated into self-development programs, and just how feedback about one's own behavior can be made most potent and effective.

The Contributions of the Present Project for Researchers

The present project contributes to both of the topics in the two preceding sections. Our results in the second, fourth, and sixth grade levels, now combined with the earlier seventh and eighth grade projects, extends and clarifies our knowledge about what patterns of interaction may be associated with measures of educational outcomes. For example, mere replication of support for Hypothesis D in the fourth and sixth grade levels is a contribution. The results of the second grade may mean that we should not expect associations at this age level to be similar to those at higher age levels. Yet the alternative interpretation is that our second grade results are the product of an unfortunate sample or poor research methodology. Should this latter alternative be true, then there are no substantive implications from our research results, they are merely inconclusive.

It must be acknowledged that in fulfilling this research contract, the aspirations of this project were not fully met. We did not produce evidence which explains how patterns of teacher influence affect educational outcomes to the extent that was originally desired. This turn of events is itself worthy of discussion. Our staff is now disposed to propose that all field studies, like this one which have been so helpful in the past, can no longer contribute the kind of knowledge that is needed. Instead, we believe that true experiments should now be carried out. The most important features of these proposed experiments are: (a) pupils must be assigned to "classes" or treatments in such a way that the initial ability of the pupils is properly controlled; (b) the length of time for learning should be long enough so that clear pre-post differences are present; (c) the nature of the learning goals and the assessment of these goals should be designed so that influences on learning which are not controlled by the teacher are at a minimum; (d) teaching patterns should be well practiced, be consequential in terms of theory, and create treatments which are radically different; and, if possible, (e) the design of the investigation should permit certain features of the interaction to be associated with different aspects of the educational outcomes.

The factor analysis, discussed in Chapter Four, identified three and, in some cases, four main factors. The recommendations about controlled experiments, described above, can now include the patterns of interaction which are based on these factors. For example, it would now seem superficial to merely vary the indirect and direct aspects of the teacher's behavior. In addition, the patterns which includes lecturing and asking teacher directed questions with an element of pupil initiation (factor two) could be varied. A third factor suggestion would be to manipulate drill patterns and pupil response patterns in a highly programmed manner. It is interesting that Smidchens (1966) used three of these same patterns, his fourth was giving directions with explanations, to create models of classroom interaction. In Smidchens' study, four basic patterns similar to those just discussed, were shown to explain the variations between classrooms. Smidchens' study showed that models of interaction could be described with considerable precision as probability coefficients located in the 100 cells of a matrix. He also showed that a linear regression formula which made use of his four different models could account for most of the variance among the 10 x 10 matrices of different teachers who taught at the same grade level.

All of the developments which have been mentioned in this summary now place us in a position at which we can (a) set forth the criteria for definitive experiments, (b) make specific suggestions about how models of interaction can be described and how they can be used to explain the mathematical similarities or dissimilarities of matrices based on n categories, and (c) how these principal dimensions of interaction can be partialled out so that they can be associated with learning outcomes. With certain refinements, repeated true experiments can probably explain the cause and effect issues. For example, teachers can influence the classroom interaction, but the learning goals and features of the pupils such as their average intelligence will also influence classroom interaction. The proportional influence of the principal causal factors will vary from one situation to another, with different phases of the learning cycle, and with different styles of teaching. An extended argument about whether teachers determine the characteristics of classroom interaction or whether pupils do, or whether it is shared, is a relatively useless argument because it underestimates the complexities of the situation.

Contributions of the Present Project for Teachers

This project contributes ideas to teachers in two different ways. First, it adds information about research on teaching effectiveness. Second, it makes suggestions about how one teacher can help another and how a teacher, working alone can modify teaching behavior. Each of these is now discussed.

Teaching effectiveness:--In this report, teaching effectiveness refers to knowledge about how a teacher can influence educational outcomes. For example, suppose a teacher decides that he would like to place special emphasis on pupil initiation so that his pupils express their own ideas more often, make their own explanations, express conclusions, or merely "speak their own mind" more often. Knowledge of teaching effectiveness and skill in making use of this knowledge means that a teacher knows several different ways to increase pupil initiation and can put them into practice. On the other hand, a teacher may wish to decrease pupil initiation for a period of time. Knowledge of teaching effectiveness means that the opposite educational outcome could be achieved by appropriate methods.

Besides relationships between relatively specific teaching behavior and pupil behavior, knowledge of teaching effectiveness can also refer to more generalized relationships. For example, a teacher may learn that by maintaining a particular balance between patterns of teacher initiation and teacher response, pupils are likely to learn more and develop more positive attitudes toward learning.

It was originally hoped that this project would contribute to knowledge of teaching effectiveness by clarifying more specific relationships between teaching behavior and pupil behavior as well as confirming more general relationships. This project has accomplished the latter and may have at least suggested an inquiry method whereby teachers can explore the more specific relationships on their own.

Taken together, the fourth, sixth, seventh, and eighth grade projects have shown support for several general relationships. It now seems clear that in classrooms in which boys and girls learn more and seem to like learning better, a teacher more often responds to ideas expressed by pupils, exercizes more restraint in the control of negative statements and criticism, and is prepared to modify his teaching behavior more radically as different learning situations occur. Given our present understanding of the school day, movements toward more responsiveness by a teacher seems quite likely to slow down the tempo of covering content. If this observation is true, one consequence of the above recommendation is that a teacher can expect to supervize the presentation of less content than currently is covered. These and other consequences are likely to follow if a teacher is successful in modifying his existing interaction patterns.

A teacher can make use of knowledge about teaching effectiveness by several different processes. Perhaps the most common process takes place when an "expert" advocates certain patterns and a teacher attempts to create these patterns over an extended period of time. By advocating, I mean that a researcher will report his results, or a successful teacher will make suggestions to another teacher who solicits advice.

Helping teachers change their teaching behavior:--A second contribution of this project is the product of our inservice training project. This phase of the study illustrated the use of five steps of inquiry. These steps could be followed alone or with a partner, but included--(a) designating desired pupil behavior, (b) identifying two or more teaching patterns which would support the desired pupil behavior, (c) practicing the teaching patterns so that the performance and methods of encoding the performance are under control, (d) making a plan of inquiry which compared the two teaching patterns, and (e) carrying out the plan in order to consider the results.

Our teachers tended to work with a partner. They selected any topic for inquiry that they wished. The one general result was that teachers tended to become more responsive after exposure to such training activities. It also seemed clear that those who spent more time on self-directed inquiry projects tended, more often, to make changes in their regular classroom teaching.

Other research projects have shown that there are other ways to help teachers modify their own behavior. For example, teachers can study interaction analysis procedures, study models of interaction, and attempt to apply these to their regular classroom instruction. What seems to happen most often is that teachers who are exposed to successful inservice training involving the analysis of interaction subsequently become more responsive to their pupils. Our results and other researchers indicate that not all teachers will modify their interaction patterns when exposed to inservice training, but enough will change so that the results can be observed under controlled conditions.

APPENDICES TO VOLUME ONE

APPENDIX A

(1) Tests of Achievement, New Zealand Unit, Fourth Grade

(2) Test of Pupil Attitude, Second Grade

(3) Test of Pupil Attitude, Fourth Grade

(4) Test of Pupil Attitude, Sixth Grade

NEW ZEALAND ACHIEVEMENT TEST AND ANSWER SHEET

Please do not mark on this booklet--use the answer sheet.

0. Ten cents is worth more than twenty-five cents.

   A. True
   B. False
   C. Don't know

1. New Zealand is bigger than the United States.

   A. True
   B. False
   C. Don't know

2. New Zealand is north of the equator.

   A. True
   B. False
   C. Don't know

3. The Maoris went to New Zealand because they needed more land on which to live and grow food.

   A. True
   B. False
   C. Don't know

4. The Maori people never fought the white settlers.

   A. True
   B. False
   C. Don't know

5. The Maoris first settled in New Zealand in the A.D. 1300's.

   A. True
   B. False
   C. Don't know

6. The people of New Zealand elect most of their government.

   A. True
   B. False
   C. Don't know

7. The Maoris are not a part of the government of New Zealand.

   A. True
   B. False
   C. Don't know

8. New Zealand has free public schools for children.

A. True
B. False
C. Don't know

9. The government of New Zealand provides medical care for the people.

A. True
B. False
C. Don't know

10. Grass is an important resource of New Zealand.

A. True
B. False
C. Don't know

11. In New Zealand public transportation is owned by the government.

A. True
B. Flase
C. Don't know

12. New Zealand was one of the first nations to give women the right to vote.

A. True
B. False
C. Don't know

13. Most of the people in New Zealand work in factories.

A. True
B. False
C. Don't know

14. The people of New Zealand are not as healthy as the people of the United States.

A. True
B. False
C. Don't know

15. Most of New Zealand gets plenty of rain.

A. True
B. False
C. Don't know

16. The Maori people settled in New Zealand after the British.

A. True
B. False
C. Don't know

17. The development of refrigeration did not affect very much the meat and butter industry in New Zealand.

A. True
B. False
C. Don't know

18. Most of the people now living in New Zealand are of British descent.

A. True
B. False
C. Don't know

19. New Zealand farmers grow enough food to feed the people of their country.

A. True
B. False
C. Don't know

20. Most of New Zealand is short of water power.

A. True
B. False
C. Don't know

21. Where is New Zealand located?

A. In Africa
B. In Southeast Asia
C. Near Australia
D. Near the North Pole
E. Don't know

22. The capital of New Zealand is

A. Auckland
B. Wellington
C. Christchurch
D. Brisbane
E. Don't know.

23. Most of the major cities in New Zealand are located

A. Inland

B. In the mountains

C. In coastal regions

D. None of the above

E. Don't know

24. The population of New Zealand is about

A. 11 million

B. 3 million

C. 25 million

D. 180 million

E. Don't know

25. The early British settlers did most of their travelling by

A. Road

B. Railroad

C. Car

D. River

E. Don't know

26. What kind of weather does most of New Zealand have?

A. Hot, dry summers and cold, wet winters

B. Hot and dry all year around

C. Mild temperatures with fairly heavy rainfall all year around

D. Long, cold winters and short, cool summers

E. Don't know

27. When people first come to a country where are they most likely to settle first?

A. On a plain

B. In the highlands

C. On the coast

D. In the mountains

E. Don't know

28. When it is summer in Livonia, what season is it in New Zealand?
    A. Winter
    B. Summer
    C. Spring
    D. Fall
    E. Don't know

29. The chief occupation of New Zealand is
    A. Raising grain crops
    B. Making machines
    C. Lumbering
    D. Animal raising
    E. Don't know

30. At one time, forests covered half of New Zealand. What destroyed most of New Zealand's forests?
    A. The Maoris burned them
    B. They were cut down or burned to make way for farming
    C. They were cut down to make Maori canoes
    D. Disease killed most of the trees
    E. Don't know

31. Why are most of the cities of New Zealand's South Island on the East coast and not on the West coast of the Island?
    A. It is nearer England
    B. There are too many sheep on the West coast
    C. The West coast is too mountainous
    D. Electric power is available on the East coast
    E. Don't know

32. Which of the following is not a big industry in New Zealand.
    A. Meat processing and freezing
    B. Ship building
    C. Cheese making
    D. Butter making
    E. Don't know

33. The Treaty of Waitangi
   A. Made all white settlers leave North Island
   B. Made peace between the Maoris and the Europeans
   C. Made the Maoris give up all their land
   D. Made the Americans leave
   E. Don't know

34. Early Maori settlements in New Zealand were along the coasts of North Island because
   A. Early settlers feared inland enemies.
   B. Early settlers wanted to get away easily
   C. Early settlers were gold miners
   D. Early settlers were sailors and fishermen
   E. Don't know

35. The early Maori settlers of New Zealand had to adjust to a new way of life because
   A. The climate was different from their tropical home islands
   B. There was not enough land
   C. Hostile natives killed them
   D. Most crops won't grow in the desert
   E. Don't know

36. New Zealand was not discovered by Europeans until about 1640 because
   A. It was not on the trade route to any other country
   B. There was nothing valuable for trade there
   C. Europeans were not interested in exploring
   D. New Zealand was too far north
   E. Don't know

37. Both the early American Indian and the early Maoris had the same problem with white settlers. This problem was
   A. Losing land to the white man
   B. Growing enough food to feed the settlers
   C. Accepting European government workers
   D. Electing honest tribal chiefs
   E. Don't know

38. Which of the following tells how the Maoris got along with the British settlers

A. The British government tried to take away most of the Maoris' land.
B. After a while, almost all the Maoris became Christian
C. The Maoris wanted the British to govern them
D. Some Maoris fought to throw off British rule
E. Don't know

39. Forestry and Farming are often industries in a country with a climate like New Zealand's. This is because

A. Cold winters and hot summers are good for growing crops
B. There is plenty of rain and a good growing season
C. There is little change in daily weather
D. There are few stores that sell food and lumber
E. Don't know

40. Which of the following correctly describes the early Maoris?

A. A savage people who had no art
B. A people without laws or rules
C. A people who were all equal to each other
D. A people who used wars as part of their religion and way of life.
E. Don't know.

Suppose there are three countries which have the following resources.

Country 1	Country 2	Country 3
A lot of good farm land	Very little farm land	Some farm land
Much water power	Much water power	Not much water power
Not many people	Many people	Not many people
Very little iron	Much iron	Much iron

41. Which country is more likely to raise extra food?

A. Country 1
B. Country 2
C. Country 3
D. All three countries
E. Don't know

43. Which country would be most likely to trade its food for another country's manufactured goods?

A. Country 1	B. Country 2
C. Country 3	D. All three countries

E. Don't know

44. What does country 1 need before it can have many industries?
A. More people and more iron.
B. More people and more farmland.
C. More iron only.
D. More people only.
E. Don't know

45. What does country 3 need before it can trade or manufacture goods?
A. Less water power
B. More iron
C. More people
D. More farmland
E. Don't know

MAP QUESTIONS

46. In place V what kind of work is done?
A. Mining
B. Lumbering
C. Sheep farming or dairy farming
D. Ship building and trading
E. Don't know

47. In place W what kind of work is done?
A. Mining
B. Lumbering
C. Sheep farming or dairy farming
D. Ship building and trading
E. Don't know

48. In place X what kind of work is done?

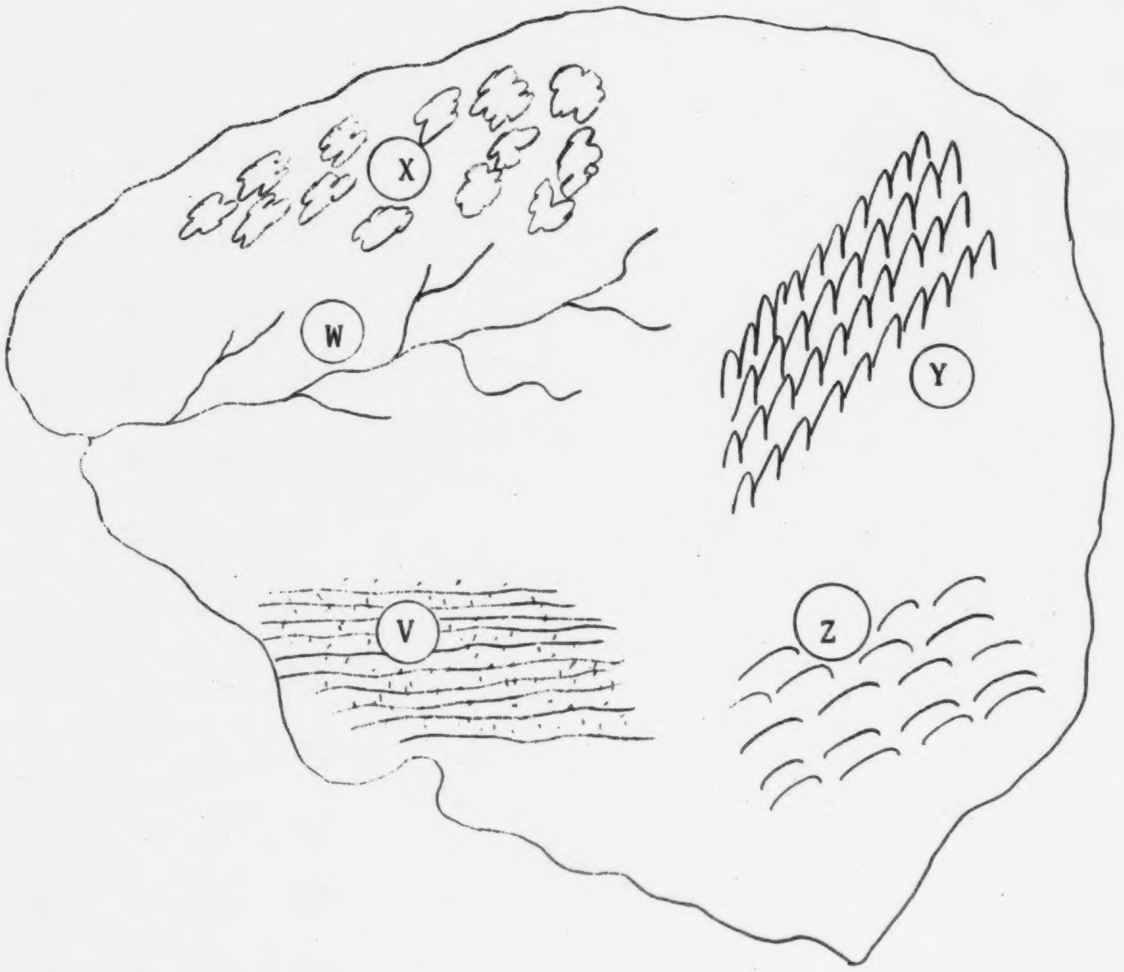
A. Mining
B. Lumbering
C. Sheep farming or dairy farming
D. Ship building and trading
E. Don't know

49. In place Y what kind of work is done?

A. Mining
B. Lumbering
C. Sheep farming or dairy farming
D. Ship building and trading
E. Don't know

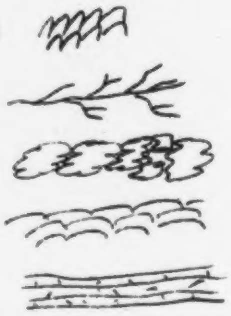
50. In place Z what kind of work is done?

A. Mining
B. Lumbering
C. Sheep farming or dairy farming
D. Ship building and trading
E. Don't know.



This is a map of an island. It has the same climate as New Zealand.

This country has mountains
and rivers
and forests
and hills
and flat grassy land



Ⓥ Ⓦ Ⓧ Ⓨ Ⓩ are five places on the map. There are five questions for you to answer about these places.

ANSWER SHEET--NEW ZEALAND ACHIEVEMENT TEST

Name____________________

0. A B C
1. A B C
2. A B C
3. A B C
4. A B C
5. A B C
6. A B C
7. A B C
8. A B C
9. A B C
10. A B C
11. A B C
12. A B C
13. A B C
14. A B C
15. A B C
16. A B C
17. A B C
18. A B C
19. A B C
20. A B C

21. A B C D E
22. A B C D E
23. A B C D E
24. A B C D E
25. A B C D E
26. A B C D E
27. A B C D E
28. A B C D E
29. A B C D E
30. A B C D E
31. A B C D E
32. A B C D E
33. A B C D E
34. A B C D E
35. A B C D E
36. A B C D E
37. A B C D E
38. A B C D E
39. A B C D E
40. A B C D E

Countries

41. A B C D E
42. A B C D E
43. A B C D E
44. A B C D E
45. A B C D E

Map Questions

46. A B C D E
47. A B C D E
48. A B C D E
49. A B C D E
50. A B C D E

INSTRUCTIONS FOR ADMINISTERING NEW ZEALAND ACHIEVEMENT TEST

Note to testers:

The packet of materials you have contains the following:

1. A tape reel, containing the instructions for the test and the test items.
2. A set of tests, including the test booklets, the maps and the answer sheets.

In addition you will find a typed script of the taped instructions on the next few pages. Thus, should the tape recorder break, you can read the instructions to the class. Also, at various places in the instructions you must hold up the answer sheet, turn off the tape recorder, answer questions, etc. These places are noted in the script by capital letters. Make sure you familiarize yourself with the instructions before you attempt to administer the test.

You should:

1. Pass out a copy of the test, the map, and an answer sheet to each child.
2. Tell the students that the instructions for taking the test are on the tape recorder.
3. Start the tape recorder.

In order to insure standardized test conditions, do not explain the meaning of a question or a word to any child. However, please make sure that the instructions are understood. There will be a place on the tape where you will stop the tape recorder to answer questions. If the class seems confused about what they are supposed to do, clear up the confusion then.

NOTE: While the test is being taken, walk around the room and check every answer sheet for the student's first and last name.

After you have collected the materials, write the teacher number and student number (in that order) in the lower right hand corner of each answer sheet.

The person who is with you today is from The University of Michigan and is going to help you get ready to answer some questions.

Other than a pencil, you should have three things on your desk:

-----A piece of paper with a map on it-----(HOLD UP MAP)

-----An answer sheet-----(HOLD UP ANSWER SHEET)

-----and a copy of the test questions-----(HOLD UP TEST BOOKLET)

Now look at the answer sheet. On the line at the top of the page, print or write your first and last name. Print or write your first and last name on the answer sheet.

Now let's talk about the test. The reason that you are taking this test is that we want to find out how much you know about New Zealand before you study about it. Of course, it is entirely possible that you have never heard of New Zealand. Or you may have heard of it, but don't know much about it. But it isn't possible to find this out unless we ask you some questions. So that is why you are being asked to take this test.

There are 50 questions. I will read each question once out loud, while you read it to yourself. Then the possible answers to the question will be read. After you figure out which is the right answer, go to the answer sheet and draw a circle around the letter of the right answer. Do not mark on the test; circle the correct answer on the answer sheet.

Now we'll do a practice question. Look at the first page of the test and find question number 0. (HOLD UP TEST AND POINT TO QUESTION 0).

Now look at the answer sheet and find the place to mark your answer to question 0. (HOLD UP ANSWER SHEET AND POINT TO 0).

I will read the question. Then you find the correct answer and circle the letter on your answer sheet.

The question is

0. Ten cents is worth more than twenty-five cents.

A. True

B. False

C. Don't know.

Now mark your answer.

You should have circled B on the answer sheet, since ten cents is not worth more than 25 cents and the letter for false is B.

Notice that there is a letter for Don't Know on every question. This is so you won't have to guess if you come to a question that you don't think you know the answer to or that you don't understand, you can circle the letter for don't know.

Circle only one letter for each question and do not work ahead.

During the test you may not ask to have a question repeated nor to have the meaning of a word explained. However, if you start to get behind or need more time to think about a question, skip that question and keep up with the tape recorder. Then after all the questions have been read, you will be given a few minutes to go back and work on those questions. However, the questions will not be repeated nor can anyone help you with a question or a word at any time.

If you have any questions about how to take the test, raise your hand after the tape recorder is stopped now. (STOP THE TAPE RECORDER AND ANSWER ANY QUESTIONS. THEN TURN THE TAPE RECORDER BACK ON.)

OK. We're ready to begin. Remember, do not mark on the test. Circle the correct letter on the answer sheet. OK, find question 1 on the test. Find the place to mark the answer to question 1 on the answer sheet.

Number 1. etc. etc. etc.

PUPIL ATTITUDE MEASURE--SECOND GRADE

The measure of student attitude in the second grade data was obtained as a part of Terry Cornell's thesis study. Terry administered two attitudinal measures in the second grade classes. Part of the test anxiety scale consisted of six items which are related to pupil attitude as it was measured in the sixth and fourth grades. These six items from Cornell's test anxiety questionnaire are as follows:

(1) Does your teacher have lots of fun with you?

(2) Does your teacher like children?

(3) Does your teacher help you?

(4) Do you sometimes think that the teacher is angry at you because you did not know your lesson?

(5) Does this teacher make school fun?

(6) Do you really like this class?

The responses to these items were either yes or no.

These items were scored by counting one point for each response that could be construed as favorable in attitude toward the teacher and zero for each response that could be construed as negative in attitude toward the teacher. The range, therefore, that was possible on the attitude measure was zero through six. When the scores are examined, it appears that there is a tendency for second grade students to be positively biased. Approximately one-quarter of all students responding scored a maximum of six. Most other scores were either four or five. The mean of the initial attitude measure was 5.3 with a standard deviation of .88; the mean of the post attitude scores was 5.25 with a standard deviation of 1.03.

MICHIGAN STUDENT QUESTIONNAIRE--FOURTH GRADE

This is not a test because there are no right or wrong answers. The answer to each question depends upon how you feel. You will be asked a lot of questions about how much you like this class, the teacher, and the work you are doing in this class. All the questions refer to *this one teacher* and *this class*. No one in your school will see your answers. By giving honest, true answers you can help us understand how students feel.

DIRECTIONS:

1. You will hear each question read twice on the tape recorder. You can read the question as you listen to it. Then answer the question carefully but quickly. Do not spend too much time. Mark the answer that comes to your mind first.
2. Mark your best answer to each question. Do not skip any question.
3. When you mark an answer be sure that the number on the answer sheet is the same as the number on the question.

HERE ARE TWO EXAMPLES

Mark your answers to these in the box for PRACTICE QUESTIONS in the upper right hand corner of the answer sheet.

PRACTICE QUESTIONS:

0. I think we should have school on Saturday.

SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

You have four alternatives to choose from. If you *STRONGLY DISAGREE* with the statement, put an "X" in the *SD* box on your answer sheet, like this:

	SD	D	A	SA
0.	☒	☐	☐	☐

00. Girls talk more than boys do.

SD--STRONGLY DISAGREE   D--DISAGREE   A--AGREE   SA--STRONGLY AGREE

If you aren't really certain about this, but you are inclined to *AGREE*, you would put an "X" in the box marked *A*, like this:

	SD	D	A	SA
00.	☐	☐	☒	☐

However, if you *STRONGLY AGREE*, put an "X" in the box marked *SA*, like this:

	SD	D	A	SA
00.	☐	☐	☐	☒

DO NOT write on this questionnaire because other students will have to use it.

11. I get along well with this teacher.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

12. This teacher has lots of fun with us.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

13. This teacher is good at thinking things through.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

14. This teacher is very fair with kids who get in trouble.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

15. I'm usually afraid that I will fail my tests.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

16. This teacher lets us all have turns doing the jobs that are fun.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

17. I think this teacher picks on some boys and girls unfairly.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

18. This teacher lets us discuss things in class.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

19. This teacher will always listen to both sides of an argument.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

20. This teacher is quick to see what mixes you up in your schoolwork.

    SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

21. This teacher makes sure WE understand our work.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

22. This teacher is always fair with each boy and girl.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

23. I worry about getting good grades.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

24. This teacher is one of the best I have ever had.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

25. I get pretty tired of this class.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

26. This teacher certainly knows how to teach.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

27. I never worry about taking tests.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

28. This teacher really understands boys and girls my age.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

29. This teacher knows a lot.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

30. I find it easy to talk with this teacher.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

PAGE THREE

31. Our teacher makes everything seem interesting and important.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

32. I worry about getting my work done.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

33. This teacher makes sure not to hurt your feelings.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

34. I really like this class.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

35. This teacher keeps order with a fair and firm hand.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

36. This teacher makes it fun to study things.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

37. This teacher doesn't listen to what SOME boys and girls have to say.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

38. Our teacher helps us when we have problems with our work.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

39. This teacher likes children.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

40. I wish I could have this teacher next year.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

41. This teacher punishes me for things I didn't do.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

42. Sometimes worrying about my schoolwork makes me feel sick.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

43. Our teacher gives us a chance to show what we are good at.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

44. I worry about giving the wrong answers in this class.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

45. This teacher gives us a chance to show what we are good at.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

46. Schoolwork is very hard for me.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

47. When I'm in trouble I can count on this teacher to help.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

48. This teacher likes to hear students' ideas.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

49. This teacher makes sure no children get left out of things.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

50. Our teacher makes sure that each of us gets a chance to talk.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

MICHIGAN STUDENT QUESTIONNAIRE--SIXTH GRADE

This is not a test because there are no wrong answers. The answer to each question is A MATTER OF OPINION, and your true opinion, whatever it is, IS THE RIGHT ANSWER. You will be asked a lot of questions about how much you like this class, the teacher, and the work you are doing here. All the questions refer to THIS ONE CLASS AND THIS PARTICULAR TEACHER. No one in your school will see your answers. By giving frank, true answers to show exactly how you feel, you can help us to understand the opinions of students.

DIRECTIONS:

1. Listen to the oral directions first.
2. Do not skip any questions.
3. Make sure that the number on the answer sheet matches the question number when you mark your answer. You will notice that there are 12 questions on each page of the booklet and 12 answers in each column on the answer sheet.
4. Work carefully, but quickly. Don't spend too much time deciding how to answer each question -- mark the answer that comes to your mind first.

HERE ARE TWO EXAMPLES

Mark your answers to these in the box for PRACTICE QUESTIONS in the upper right hand corner of the answer sheet.

PRACTICE QUESTIONS:

0. I think we should have school on Saturday.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

You have four alternatives to choose from. If you STRONGLY DISAGREE with the statement, put an "X" in the SD box on your answer sheet, like this:

	SD	D	A	SA
0.	☒	☐	☐	☐

00. Girls talk more than boys do.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

If you aren't really certain about this, but you are inclined to AGREE, you would put an "X" in the box marked A, like this:

	SD	D	A	SA
00.	☐	☐	☒	☐

However, if you STRONGLY AGREE, put an "X" in the box marked SA, like this:

	SD	D	A	SA
00.	☐	☐	☐	☒

DO NOT write on this questionnaire because other students will have to use it.

PAGE ONE

1. I get along well with this teacher.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

2. This teacher has lots of fun with us.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

3. This teacher is good at thinking things through.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

4. This teacher helps to settle quarrels fairly.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE.

5. I'm usually afraid that I will fail my tests.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

6. This teacher lets some kids get by without working very hard.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

7. This teacher praises us for good work.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

8. This teacher lets us all have turns doing the jobs that are fun.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

9. I think this teacher picks on some boys and girls unfairly.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

10. We don't pay much attention in this class.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

11. This teacher lets us discuss things in class.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

12. We behave well in this class even when the teacher is out of the room.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

PAGE TWO

13. This teacher will always listen to both sides of an argument.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

14. This teacher is quick to see what confuses you in your schoolwork.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

15. This teacher makes sure WE understand our work.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

16. This teacher is always fair with each boy and girl.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

17. I worry about getting good grades.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

18. This teacher always asks the OTHER kids the EASY questions.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

19. What we learn in this class makes me want to learn new things.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

20. This teacher is one of the best I have ever had.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

21. I get pretty bored in this class.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

22. This teacher sometimes punishes the whole class for something one person did.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

23. I never worry about taking tests.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

24. This teacher certainly know how to teach.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE ST--STRONGLY AGREE

PAGE THREE

25. This teacher really understands boys and girls my age.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

26. This teacher knows a lot.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

27. I find it easy to talk with this teacher.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

28. Our teacher makes everything seem interesting and important.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

29. I worry about getting my work done.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

30. I'm afraid to raise my hand to talk in this class.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

31. Our teacher never gives us extra assingments as punishment.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

32. This teacher makes sure not to hurt your feelings.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

33. This teacher often "bawls you out" in front of the class.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

34. We often complain just to get out of work.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

35. I really like this class.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

36. The children in this class behave well without being told.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

PAGE FOUR

37. This teacher is not easily upset.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

38. I like to be called on in this class.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

39. This teacher keeps order with a fair and firm hand.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

40. This teacher makes it fun to study things.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

41. This teacher never asks our opinion in planning work to be done.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

42. This teacher doesn't listen to what SOME boys and girls have to say.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

43. This teacher never gets angry and shouts at us.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

44. Our teacher helps us when we have problems with our work.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

45. This teacher has some special favorites or "teacher's pets".

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

46. This teacher makes me nervous.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

47. This teacher helps us get the most out of each day.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

48. This teacher likes children.

SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

PAGE FIVE

49. I wish I could have this teacher next year.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

50. This teacher likes to hear students' ideas.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

51. This teacher makes sure no children get left out of things.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

52. Our teacher is very good at explaining things clearly.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

53. I worry about giving the wrong answers in this class.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

54. Schoolwork is very hard for me.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

55. This teacher gives us a chance to show what we are good at.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

56. When I'm in trouble I can count on this teacher to help.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

57. This teacher punishes me for things I didn't do.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

58. Sometimes worrying about my schoolwork makes me feel sick.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

59. Our class gets a lot done each day.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

60. Our teacher makes sure that each one of us gets a chance to talk.
SD--STRONGLY DISAGREE D--DISAGREE A--AGREE SA--STRONGLY AGREE

APPENDIX B

INSERVICE TRAINING

(1) Outline of Inservice Training Schedule

(2) Teacher Post Meeting Reaction Sheet

(3) Teacher Project Report Form

(4) Teacher Time Log Record Sheet

(5) Teacher Team Progress Report

SYNOPSIS OF THE INSERVICE WORKSHOP

Date	Period 1	Period 2	Period 3	Period 4
11/25	General orientation to the nature and purpose of Project E and the inservice workshop	Distribution of Materials	Discussion of the need for lesson plans	Development of lesson plans by groups of teachers
11/26	Completion of lesson plans	Directions given for the administration of paper and pencil inventories	Discussion about anxieties associated with being recorded	Discussion continued
1/9	Discussion of two contrasting styles of teaching	Discussion of how one can tell the difference between the two styles	The development of categories to objectively describe teaching behavior	Introduction to Flanders' basic ten categories--distribution of reading material on teaching behavior
1/10	Coding practice using Flanders' basic ten categories	Introduction to the steps of inquiry	Role playing using a time-line display to plan interaction patterns and compare what was intended to what actually occurred	Social skill training exercises
1/15	Discussion of the nature and value of behavioral objectives	Practice in coding verbal behavior into histogram and time-line displays	Social skill exercises involving the use of broad and narrow questions	Introduction to the matrix display of interaction analysis data
1/16	Practice in coding verbal behavior into a matrix	Coding practice continued	Discussion of the interpretation of the matrix and its advantages and disadvantages	Role playing in small groups while coding the verbal behavior directly into a matrix

Continued next page

SYNOPSIS--Continued

Date	Period	Period 2	Period 3	Period 4
1/17	Orientation of sixth graders to the workshop and micro-teaching	Demonstration of a micro-teaching session	Planning for the micro-teaching sessions	Planning continued
1/22	Micro-teaching experiences, each followed by a consultation with one of the workshop leaders	Micro-teaching continued	Micro-teaching continued	Micro-teaching continued
1/23	Discussion of the micro-teaching sessions	Discussion continued	Introduction to the concept of levels of abstraction	Social skill exercises in small groups using various patterns of changes in levels of abstraction
1/30	Discussion of the projects and experiments that teachers have conducted in their classes	Discussion continued	Discussion of the skills associated with consulting or helping a colleague with a project	Discussion of projects that may be conducted when a substitute is provided so that teams may work together
	Classroom projects to determine the effects of altering teaching behavior			
2/20	Discussion of projects in groups of six	Selected reports given to total group	Role playing	Coding practice
2/21	Design of inquiry	Design of inquiry	Presentation of several types of coding schemes to serve more specific purposes	Discussion of the need to develop category schemes to help solve particular problems
3/12	Discussion of inquiry projects conducted by participants	Discussion of classroom problems	Coding exercise	Achievement test
3/13	Discussion of lesson plans	Evaluation of inservice workshop	Achievement test completion	Achievement test completion

TEACHER POST MEETING REACTION SHEET

Name____ Date______________________

WORKSHEET REACTION SHEET

Each item in the first section must be marked twice. Respond first in terms of what happened in your best judgement. Next, indicate what you expected to happen.

EXAMPLE:

1. There was ample opportunity for me to express my own ideas today.

(Happened)

ALL OF THE TIME	1	2	3	4	[✓ 5]	6	7	8	9	10	NONE OF THE TIME
	1	[✓ 2]	3	4	5	6	7	8	9	10	

(Expected)

Mark the top scale according to your own perception of what actually happened today. The circle around the number 5 in the top scale indicates that the respondent felt that he had "ample opportunity to express his own ideas" about one-half of the time.

Mark the bottom scale to indicate what you expected to have happened today. The circle around number 2 in the bottom scale indicates that the respondent expected to have had "ample opportunity to express his own ideas" nearly all of the time.

NOTE: THE DIFFERENCE BETWEEN YOUR CHECKS ON THE TOP SCALE VERSUS THOSE ON THE BOTTOM BECOME A MEASURE OF YOUR DISSATISFACTION. When the checks are on the same scale position, you are apparently satisfied with your activities because what happened was what you expected. When there is a difference, the magnitude of that difference indicates the degree of your dissatisfaction.

Section One

1. Assuming that "very theoretical" is the opposite of "very practical," how would you rate TODAY's session? More theoretical? More practical?

(Happened)

VERY THEORETICAL	1	2	3	4	5	6	7	8	9	10	VERY PRACTICAL
	1	2	3	4	5	6	7	8	9	10	

(Expected)

2. Assuming that the approach to ideas or problems before our group could be determined either by the consultants or by the teachers participating, where did the approach come from TODAY?

(Happened)

FROM THE CONSULTANTS	1	2	3	4	5	6	7	8	9	10	FROM THE TEACHERS
	1	2	3	4	5	6	7	8	9	10	

(Expected)

3. Assuming that some of the time the consultants control the activities and at other times this control can be shared or given exclusively to the teachers participating, what kind of balance occurred TODAY?

(Happened)

INSTRUCTOR DIRECTED	1	2	3	4	5	6	7	8	9	10	TEACHER DIRECTED
	1	2	3	4	5	6	7	8	9	10	

(Expected)

4. Assuming that your relationships with the consultants could be considered "formal and impersonal" versus "informal and personal", how would you characterize these relationships TODAY?

(Happened)

VERY FORMAL	1	2	3	4	5	6	7	8	9	10	VERY INFORMAL
	1	2	3	4	5	6	7	8	9	10	

(Expected)

5. Assuming that your own motivation for participating could come either from the consultants' stimulation or from self-generated curiosity, what motivated you TODAY?

(Happened)

MOSTLY INSTRUCTOR	1	2	3	4	5	6	7	8	9	10	MOSTLY SELF
	1	2	3	4	5	6	7	8	9	10	

(Expected)

6. Assuming that any progress you may have made today could be due to instruction or to your own determination, how would you rate TODAY?

(Happened)

INSTRUCTION	1	2	3	4	5	6	7	8	9	10	SELF-DETERMINATION
	1	2	3	4	5	6	7	8	9	10	

(Expected)

7. Assuming that you could consider what you have learned in the training session today either unworthwhile or extremely worthwhile, how would you rate what you have learned TODAY?

(Happened)

UNWORTHWHILE	1	2	3	4	5	6	7	8	9	10	EXTREMELY WORTHWHILE
	1	2	3	4	5	6	7	8	9	10	

(Expected)

8. When teachers express their own ideas in workshop sessions, it is assumed that the consultants either seem to understand well or understand poorly. How do you feel the consultants understood ideas expressed by teachers TODAY?

(Happened)

VERY POORLY	1	2	3	4	5	6	7	8	9	10	EXTREMELY WELL
	1	2	3	4	5	6	7	8	9	10	

Section Two

The questions in this section refer to the activities today that were learning experiences for you. These might include learning the categories of Interaction Analysis, mastering the coding procedure, making observations under the pressure of time, making a matrix, interpreting a matrix. Only one response per item is required.

9. How difficult do you feel today's activities were?

VERY DIFFICULT	1	2	3	4	5	6	7	8	9	10	VERY EASY

10. How hard do you feel you worked today to learn the material?

VERY HARD	1	2	3	4	5	6	7	8	9	10	VERY EASY

11. How hard do you feel you worked today relative to the other people in this workshop?

1	2	3	4	5	6	7	8	9	10
HARDER THAN MOST OTHERS				ABOUT THE SAME AS THE OTHERS				NOT AS HARD AS THE OTHERS	

12. After evaluating the potential worth of today's workshop, do you feel that you should have worked harder, less, or about as hard as you did?

1	2	3	4	5	6	7	8	9	10
HARDER				AS HARD AS I DID					LESS HARD THAN I DID

13. Describe one or more problems which you have encountered in teaching which you feel we could attack in this workshop.

TEACHER PROJECT REPORT FORM

Please fill out as completely as possible.

1. What was the purpose of the project?

2. What steps were taken?

3. What data (if any) were collected?

4. What were your own behavioral objectives?

5. Estimate the hours that you spent:

Estimate the hours that you spent:		Estimate the hours spent by your partner(s):	
Planning the project	_____	Planning the project	_____
Practicing the project	_____	Practicing the project	_____
For the rest of the project	_____	For the rest of the project	_____

6. Date project was started: __________ Date project was finished __________

Your Name: ______________________________

List others: ______________________________

____

____

TEACHER TIME LOG RECORD SHEET

Name ____

Period--From: ______________________ to ______________ (dates)

Directions: Please record as accurately and honestly as possible the time spent on various project-related activities below.

	Hours	Minutes
Practice coding		
Practice coding into or analyzing a matrix		
Taping and analyzing tape recordings		
Reading		
Serious discussions with other educators or administrators		
Other (please describe): ______________ ______________________________ ______________________________		
-- To the right is estimated the total time spent for inquiry projects. The number of projects involved is ______.		
TOTAL		

TEACHER TEAM PROGRESS REPORT

NAME____ DATE__________________

The questions in this report are intended to be reports on work you were able to accomplish in your classroom. Please be as frank and accurate as possible.

The method of marking items is as follows:

(a) Check 0 if you did not engage in this activity.
(b) Check 1/2 if you spent up to 1/2 hour.
(c) Check 1 if you spent up to 1 hour.
(d) Check other numbers in terms of hours spent.

1. Practice coding by tape, classroom observation, or some other methods.

7 6 5 4 3 2 1 1/2 0
Hours

2. Filling our and/or analyzing an interaction analysis matrix.

7 6 5 4 3 2 1 1/2 0
Hours

3. Reading about interaction analysis.

7 6 5 4 3 2 1 1/2 0
Hours

4. Serious discussions about this inservice program with another educator. (teacher, principal, supervisor, or team members, etc.)

7 6 5 4 3 2 1 1/2 0
Hours

5. Consciously attempting to modify or change your classroom behavior as part of your own inservice project.

7 6 5 4 3 2 1 1/2 0
Hours

6. Helping another teacher OR your team in any way in connection with this inservice training program.

7 6 5 4 3 2 1 1/2 0
Hours

7. Any productive time spent on this inservice program not mentioned above (e.g., tabulating, using or learning to use slide rule, etc.).

7 6 5 4 3 2 1 1/2 0
Hours

Each item in this section must be marked twice. Respond first in terms of your own perception of what actually happened. Mark the second scale to indicate what you would have preferred. (The midpoint on the scales, number 5, would indicate in the first item, for example, "just adequate".)

8. Last week the time available to me for working on this inservice program was --

a. (Happened)
1 2 3 4 5 6 7 8 9
More than adequate — very inadequate

b. (Preferred)
1 2 3 4 5 6 7 8 9
more than adequate — very inadequate

9. Last week the support and help from other building team members or the principal was--

a. (Happened)
1 2 3 4 5 6 7 8 9
more than adequate — very inadequate

b. (Preferred)
1 2 3 4 5 6 7 8 9
more than adequate — very inadequate

10. Last week the progress I made in understanding my own classroom teaching behavior was--

a. (Happened) |___|___|___|___|___|___|___|___|___|

1 2 3 4 5 6 7 8 9

more than adequate ... very inadequate

b. (Preferred) |___|___|___|___|___|___|___|___|___|

1 2 3 4 5 6 7 8 9

more than adequate ... very inadequate

11. I have changed my teaching behavior to the extent that my students are --

a. (Happened) |___|___|___|___|___|___|___|___|___|

1 2 3 4 5 6 7 8 9

unaware of the change ... very aware of the change

b. (Preferred) |___|___|___|___|___|___|___|___|___|

1 2 3 4 5 6 7 8 9

unaware of the change ... very aware of the change

12. Describe any changes in student behavior or attitudes which might be due to changes you have attempted in your teaching behavior.

____

____

____

____

13. Describe the experiments, objectives, and category schemes (if any were used) that you have made in your classroom since the last workshop session.

____

____

____

____

APPENDIX C

Analysis of Covariance for the Sixth Grade

TABLE C-1

ANALYSIS OF COVARIANCE--ACHIEVEMENT BY i/i+d

Step	Source	SS	MS	df	F	p
1	Groups	364970.000000	182485.000000	2	2.615	0.0916
	Within	1884202.000000	69785.250000	27		
2	Regression	110829.000000	110829.000000	1	1.625	0.2137
	Within	1773373.000000	68206.625000	26		
3	Regression	394904.000000	394904.000000	1	4.916	0.0212
	Within	1854268.000000	66223.812500	28		
4	Groups	80895.000000	40447.500000	2	0.593	0.5600
	Within	1773373.000000	68206.625000	26		
Total		2249172.000000		29		

TABLE C-2

MEANS AND ADJUSTED MEANS--ACHIEVEMENT BY i/i+d

Variable	Group 1	Group 2	Group 3
i/i+d	170.100	141.000	68.000
Achievement, unadjusted	464.000	395.800	203.500
Achievement, adjusted	417.674	380.299	265.326

TABLE C-3

ANALYSIS OF COVARIANCE--i/i+d BY ACHIEVEMENT

Step	Source	SS	MS	df	F	p
1	Groups	55334.062500	27667.031250	2	7.563	0.0025
	Within	98772.937500	3658.256836	27		
2	Regression	5809.812500	5809.812500	1	1.625	0.2137
	Within	92963.125000	3575.504639	26		
3	Regression	27057.750000	27057.750000	1	4.916	0.0212
	Within	127049.250000	4537.472656	28		
4	Groups	34086.125000	17043.062500	2	4.767	0.0172
	Within	92963.125000	3575.504639	26		
Total		154107.000000		29		

TABLE C-4

MEANS AND ADJUSTED MEANS--i/i+d BY ACHIEVEMENT

Variable	Group 1	Group 2	Group 3
Achievement	464.000	395.800	203.500
i/i+d, unadjusted	170.100	141.000	68.000
i/i+d, adjusted	164.016	138.703	76.381

TABLE C-5

ANALYSIS OF COVARIANCE--2ND ATTITUDE BY i/i+d

Step	Source	SS	MS	df	F	p
1	Groups	6384.062500	3192.031250	2	31.512	0.0000
	Within	2735.000000	101.296295	27		
2	Regression	37.893066	37.893066	1	0.365	0.5508
	Within	2697.106934	103.734879	26		
3	Regression	2380.605469	2380.605469	1	7.310	0.0039
	Within	6738.457031	240.659180	28		
4	Groups	4041.350098	2020.675049	2	19.479	0.0000
	Within	2697.106934	103.734879	26		
Total		9119.062500		29		

TABLE C-6

MEANS AND ADJUSTED MEANS--2ND ATTITUDE BY i/i+d

Variable	Group 1	Group 2	Group 3
i/i+d	1.701	1.410	0.680
2nd Attitude, unadjusted	189.374	166.557	154.157
2nd Attitude, adjusted	188.517	166.270	155.300

TABLE C-7

ANALYSIS OF COVARIANCE--i/i+d BY 2ND ATTITUDE

Step	Source	SS	MS	df	F	p
1	Groups	5.533694	2.766847	2	7.563	0.0025
	Within	9.877179	0.365821	27		
2	Regression	0.136864	0.136864	1	0.365	0.5508
	Within	9.740315	0.374627	26		
3	Regression	4.023133	4.023133	1	7.310	0.0039
	Within	11.387740	0.406705	28		
4	Groups	1.647425	0.823712	2	2.199	0.1312
	Within	9.740315	0.374627	26		
Total		15.410873		29		

TABLE C-8

MEANS AND ADJUSTED MEANS--i/i+d BY 2ND ATTITUDE

Variable	Group 1	Group 2	Group 3
i/i+d	189.374	166.557	154.157
2nd Attitude, Unadjusted	1.701	1.410	0.680
2nd Attitude, Adjusted	1.564	1.435	0.792

TABLE C-9

ANALYSIS OF COVARIANCE--ACHIEVEMENT BY 2nd ATTITUDE

Step	Source	SS	MS	df	F	p
1	Groups	36.497498	18.248749	2	2.615	0.0916
	Within	188.418518	6.978463	27		
2	Regression	5.569504	5.569504	1	0.792	0.3817
	Within	182.849014	7.032654	26		
3	Regression	10.795944	10.795944	1	1.344	0.2448
	Within	214.120071	7.647145	28		
4	Groups	31.271057	15.635529	2	2.223	0.1284
	Within	182.849014	7.032654	26		
Total		224.916016		29		

TABLE C-10

MEANS AND ADJUSTED MEANS--ACHIEVEMENT BY 2ND ATTITUDE

Variable	Group 1	Group 2	Group 3
2nd Attitude	189.374	166.557	154.157
Achievement, unadjusted	4.640	3.958	2.035
Achievement, adjusted	5.513	3.801	1.319

TABLE C-11

ANALYSIS OF COVARIANCE--2ND ATTITUDE BY ACHIEVEMENT

Step	Source	SS	MS	df	F	p
1	Groups	6384.062500	3192.031250	2	31.512	0.0000
	Within	2735.000000	101.296295	27		
2	Regression	80.845459	80.845459	1	0.792	0.3817
	Within	2654.154541	102.082855	26		
3	Regression	437.714844	437.714844	1	1.344	0.2448
	Within	8681.347656	310.048096	28		
4	Groups	6027.191406	3013.595703	2	29.521	0.0000
	Within	2654.154541	102.082855	26		
Total		9119.062500		29		

TABLE C-12

MEANS AND ADJUSTED MEANS--2ND ATTITUDE BY ACHIEVEMENT

Variable	Group 1	Group 2	Group 3
Achievement	4.640	3.958	2.035
2nd Attitude, unadjusted	189.374	166.557	154.157
2nd Attitude, adjusted	190.092	166.828	153.168

LIST OF REFERENCES

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Coats, W. D. (1966) *Investigations and simulation of the relationships among selected classroom variables*. Unpublished doctoral dissertation. The University of Michigan, 1966.

Flanders, N. A. (1960) *Teacher influence, pupil attitudes, and achievement*. Cooperative Research Project No. 397, U.S. Office of Education. The University of Minnesota, 1960. (Now out of print).

Flanders, N. A. (1965) Teacher influence, pupil attitudes, and achievement. *Cooperative Research Monograph, No. 12*. (OE-25040) Washington, D.C.: U.S. Department of Health, Education, and Welfare: Office of Education, U.S. Government Printing Office, 1965. pp. 126 + ix. (Now out of print)

Flanders, N. A. (1970) *Analyzing teaching behavior*. Reading, Mass.: Addison-Wesley Publishing Co., 1970.

Gess, L. R. (1969) Effects of information which is provided to teachers concerning students on the attitudes and the behaviors of the teachers and the students. Unpublished doctoral dissertation, The University of Michigan, 1969.

Miller, George L. (1969) *Relationships between teacher flexibility and teacher reinforcement on the attitudes and the internality-externality of students*. Unpublished doctoral dissertation, The University of Michigan, 1969.

Smidchens, U. (1967) *Classification of teaching episodes through the use of teacher influence patterns*. Unpublished doctoral dissertation, The University of Michigan, 1967.

Smidchens, U. and Roth, R. (1968) Michigan-Ohio Regional Educational Laboratory's Computerization of interaction analysis project. (Mimeographed) Michigan-Ohio Regional Educational Laboratory, 3750 Woodward Ave., Detroit, Michigan, 48201. (No longer available from MOREL.)

Snedecor, G. W. and Cochran, W.G. *Statistical Methods*. Iowa State University Press, 1967. (6th Edition.)

Wherry, R. J. (1931) A new formula for predicting the shrinkage of the coefficient of multiple correlation. *Annals of Math. Stat.*, 1931, *2*, 440-457.

Winer, B.J. (1962) *Statistical principles in experimental design*. New York: McGraw-Hill, 1962.

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Volume II of II Volumes

TEACHER INFLUENCE PATTERNS AND PUPIL ACHIEVEMENT IN THE SECOND, FOURTH, AND SIXTH GRADE LEVELS

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PREFACE TO VOLUMES I AND II

This terminal contract report consists of two volumes. The first volume describes the procedures used in our second, fourth, sixth grade, and inservice training projects and then presents the results. The second volume is a data bank in which achievement, attitude, and interaction analysis data are stored.

Contract research projects provide professor and graduate student alike with resources: The professor realizes independence, research opportunity, and headaches; the graduate student obtains experience, income, and fatigue. Many different individuals had some part to play in this total effort. The list includes elementary children, high school students, undergraduate and graduate university students, engineers, project secretaries, teachers, other professors, and so on. To nearly all of them the senior staff expresses its sincere gratitude and to the others, the ones who provided clever delaying tactics and problems to be solved, we can only say that we savored the challenge.

This report involves one matter of style which should be clarified. The tabled data and printed steps in statistical analysis are minimal. Some readers, of course, will object because we have "not provided sufficient information for another research scholar to verify our conclusions" should he so desire. We chose this style because most of our readers are not interested in extensive displays of data and details at each step in statistical analysis. To compensate for this blaspheme, the complete data and computer print-outs of our statistical procedures will be made available to those who can pay for the Xerox costs. We will keep our records intact for a number of years and those who care enough to make the effort and who know enough to ask clear questions can obtain additional information by writing to the Project Director. Professional critics, of course, will have special needs in terms of access to the data. All are invited to make inquiries.

At each grade level we collected and stored much more data than are reported. For example, very little has been done, so far, with the data in subscripted categories. We have also many more composite matrices and time-use breakdowns than can be found in Volume II. This is especially true of the fourth grade in which we have more kinds of matrices than we had space for printing. The senior research associates at each grade level worked much harder than this report indicates. Each wrote his own special report and these have been combined into a single chapter in Volume I. This can only be done by asking what is most relevant and ruthlessly discarding everything else.

Ned A. Flanders
Ann Arbor, 1970

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Part I

SECOND GRADE

There are fifteen self-contained second grade classes reported in this section. The code numbers of the teachers start with one and go to 17 with numbers 12 and 13 missing. Each teacher had the following years of experience (Note: the teacher's code number comes first, the years of experience follows the hyphen): 1-4; 2-1; 3-7; 4-3; 5-7; 6-6; 7-2; 8-2; 9-6; 10-17; 11-23; 14-1; 15-1; 16-2; and 17-8.

For those interested in the socio-economic features of classroom interaction, the following comments may be helpful. Teacher number one's class is in a group by itself. This class was predominantly negro and had many children who could not read at the time of these observations. The children in this classroom were mostly from lower class backgrounds Classes 2, 4, and 6 appeared to contain children who were from predominantly lower middle class or upper lower class backgrounds. Classes number 3, 5, 9, 10, 11, and 17 appeared to be pretty much middle class children. Classes number 7, 8, 15, and 16 were from upper middle class backgrounds. There are no data from rating sheets or hard data from the subjects to support these socio-economic classifications. They were made on the basis of the judgement of the research staff who visited the classes and the immediate school neighborhoods many times.

The teachers are volunteers who were recruited by soliciting their cooperation. In all classes there were no student teachers and outside teachers for special subjects were either non-existent or used for minimum periods of time. The 15 teachers and classrooms cannot be said to be representative of a population in terms of any systematic procedure of sampling.

Achievement and Attitude Scores.

The next few pages contain tables of data concerning the 15 second grade classes. Pre-achievement scores refer to portions of a standardized test (see Volume I) administered before Christmas. Post-achievement scores are the results of the same tests late in the spring, after all observations had been completed. Initial and final attitude scores are from a five-item scale administered at the same time as the achievement tests. The attitude scale is very short and with this age level, the results are probably quite unreliable. The last table in this section summarizes a few interaction scores for each class.

TABLE I-1

PRE-ACHIEVEMENT MEANS--SECOND GRADE

Teacher Number	Paragraph Meaning	Rank	Word Study Skills	Rank	Arithmetic	Rank
1	5.95	15	33.21	15	16.68	14
2	37.23	13	50,48	11	15.96	15
3	59.59	6	61.17	4	26.69	6
4	49.61	11	49.83	12	18.41	12
5	45.42	12	55.50	10	21.89	10
6	23.11	14	42.11	14	18.32	13
7	73.38	1	64.67	2	30.29	1
8	57.65	7	57.13	9	25.65	7
9	57.62	8	62.19	3	29.96	2
10	59.83	5	57.83	8	25.00	8
11	60.40	4	68.14	1	28.27	4
14	50.71	10	46.43	13	19.52	11
15	60.77	3	58.46	6	24.23	9
16	51.32	9	58.46	7	27.09	5
17	61.17	2	59.09	5	28.48	3

TABLE I-2

POST ACHIEVEMENT MEANS--SECOND GRADE

Teacher Number	Paragraph Meaning		Word Study Skills		Arithmetic Problem Solving	
	Mean	Rank	Mean	Rank	Mean	Rank
1	34.61	15	41.16	15	18.68	15
2	61.60	12	53.69	13	23.85	11
3	79.03	7	63.17	10	31.93	4
4	69.30	10	56.61	12	22.26	12
5	71.23	9	63.54	9	26.54	10
6	40.05	14	49.11	14	22.21	13
7	88.00	2	70.57	1	33.38	2
8	68.52	11	63.61	8	21.83	14
9	87.35	3	69.19	3	33.00	3
10	86.62	4	65.79	6	29.24	7
11	89.00	1	70.23	2	33.46	1
14	60.10	13	60.19	11	26.74	9
15	85.46	5	64.91	7	29.55	6
16	78.68	8	65.91	5	28.32	8
17	80.13	6	66.52	4	30.09	5

TABLE I-3

SECOND GRADE INITIAL AND FINAL ATTITUDE SCORES

Teacher Number	Initial Attitude		Final Attitude	
	Mean	Rank	Mean	Rank
1	4.50	15	3.67	15
2	5.39	7	5.26	9
3	5.79	1	5.82	1
4	5.76	2	5.57	4
5	5.50	5	4.83	13
6	4.93	12	5.0	11
7	5.44	6	5.61	3
8	5.37	8	5.42	6
9	4.72	14	5.33	8
10	5.63	3	5.44	5
11	5.29	9	5.19	16
14	5.15	10	4.95	12
15	5.10	11	5.38	7
16	4.83	13	4.78	14
17	5.60	4	5.70	2

TABLE I-4

SECOND GRADE MEANS FOR EACH CLASS
FINAL ACHIEVEMENT ADJUSTED FOR INITIAL ACHIEVEMENT*

Teacher Number	Paragraph Meaning			Word Study Skills			Arithmetic Problem Solving		
	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
1	67.48	17.47	19	57.92	12.53	19	26.49	10.04	19
2	70.14	24.85	26	58.26	11.26	26	32.20	8.56	26
3	74.21	18.44	26	58.97	10.04	27	29.32	8.88	26
4	70.80	13.37	23	60.93	8.71	23	28.26	9.83	20
5	76.43	16.43	25	63.82	7.18	25	28.88	7.37	28
6	61.68	13.03	19	59.20	7.55	19	28.30	4.99	19
7	72.24	12.32	19	63.22	4.93	21	28.57	5.38	17
8	64.25	14.09	21	62.46	9.58	22	21.59	6.11	20
9	85.48	17.53	23	64.39	6.85	24	27.65	6.16	21
10	81.92	18.82	26	64.32	7.52	26	28.31	7.98	29
11	83.22	15.88	21	61.26	8.27	18	30.76	7.48	18
14	61.48	17.68	19	67.04	8.17	21	31.94	7.48	20
15	81.17	14.73	19	62.43	5.45	22	30.53	5.94	19
16	81.05	18.07	20	64.27	7.77	19	25.49	6.39	20
17	75.48	12.94	19	64.09	5.66	21	27.50	6.46	18

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*Students at or near test ceiling on the pretest are removed. This causes variation in class size.

TABLE I-5

i/i+d AND I/I+D, ALL OBSERVATIONS

Teacher Number	$\frac{I}{I+D}$	$\frac{i}{i+d}$	Rank I/I+D	Rank i/i+d
1	0.213	0.269	14	12
2	0.441	0.349	1	3
3	0.239	0.306	13	6
4	0.382	0.363	3	2
5	0.353	0.296	7	9
6	0.300	0.304	9	7
7	0.372	0.334	4	4
8	0.357	0.270	6	11
9	0.260	0.304	11	8
10	0.358	0.267	5	13
11	0.320	0.390	8	1
14	0.178	0.246	15	14
15	0.248	0.115	12	15
16	0.436	0.322	2	5
17	0.299	0.290	10	10

Correlation of i/i+d with I/I+D = 0.25.

The top four classes in I/I+D were teacher number 2, 16, 4, 7; the middle classes were teachers number 10, 8, 5, 11, 6, and 17; the low classes were 9, 15, 3, 1, and 14.

Interaction Analysis Data.

On the pages which follow interaction analysis data will be presented for the 15 second grade classrooms. First, the system of categories which was used for coding will be explained. Second, the raw tallies within a 10 x 10 matrix for each class are presented. Third, the 10 x 10 matrix data for each teacher are presented to the base 1,000 which permits direct comparison of cell frequencies and column totals. Fourth, the 22 x 22 matrices, to the base 1,000, are shown for each teacher.

Due to limitations on the total number of printed pages, additional breakdowns are available from the project director. For example, we have data for each teacher on reading, language arts, and arithmetic. There are also cumulative matrices for different teaching purposes such as "getting ready" versus "discussion and reading." These options will become clearer, in a moment, after the category system is explained.

The System of Categories:--Outlined below are the twenty-two categories which were used in the second grade. As can easily be seen, the 22 category system is obtained by subscripting the basic ten category system which was referred to in Volume I of this report. The main feature of these subscripts can be seen in Categories 4, 5, 8, and 9. This feature refers to the level of thinking involved in the statement. Subscript 1 designates the lowest level of factual meaning; subscript 3 designates explanation, cause and effect, functional relationships, and, in general the highest level of reasoning; and subscript 2 would be all other statements not subscripted by 3 and 1.

SUB-CATEGORIES USED IN SECOND GRADES, 1966-67

Category	
Teacher Talk	
1	No subscripts.
2	No subscripts.
3-1	Repetition, superficial recognition of student's idea.
3-2	Student's idea is developed by teacher. Teacher compares one student's idea to another's or expands the student's idea.
3-3	Teacher asks a question based on a student's idea.
4-1	Questions dealing with memory; previously learned material; naming; simple describing; what-where-when information.
4-2	Questions involving comparison; discrimination; identification of a common characteristic among objects or events; grouping or labeling by means of a common characteristic; breakdown of global whole into parts; simple explanation; more complex cognition than level 1 but less complex than level 3.
4-3	Questions which ask the student to infer, or derive by reasoning; conclude from evidence; explain phenomena, tell why; show relationships between points of learned information; cause and effect statements; opinions.
5-1	Statements dealing with memory; previously learned material; naming; simple describing; what-where-when information.
5-2	Statements including comparison; discrimination; identification of a common characteristic among objects or events; grouping or labeling by means of a common characteristic; breakdown of global whole into parts; simple explanation; more complex cognition than level 1 but less complex than level 3.
5-3	Statements which infer, or derive by reasoning; conclude from evidence; explain phenomena, tell why; show relationships between points of learned information; cause and effect statements; opinions.
6-1	Gives directions without explaining why.
6-2	Explains reasons for directions.
7	No subscript.

Student Talk

8-1	Responses dealing with memory; previously learned material; naming; simple describing; what-where-when information.
8-2	Responses showing comparison; discrimination; identification of a common characteristic among objects or events; grouping or labeling by means of a common characteristic; breakdown of global whole into parts; simple explanation; more complex cognition than level 1 but less complex than level 3.
8-3	Responses which infer, or derive by reasoning; conclude from evidence; explain phenomena, tell why; show relationships between points of learned information; cause and effect statements; opinions.
9-1	Initiated statements or questions dealing with memory; previously learned material; naming; simple describing; what-where-when information.
9-2	Initiated statements showing comparison; discrimination; identification of a common characteristic among objects or events; grouping or labeling by means of a common characteristic; breakdown of global whole into parts; simple explanation; more complex cognition than level 1 but less complex than level 3.
9-3	Initiated statements which infer, or derive by reasoning; conclude from evidence; explain phenomena, tell why; show relationships between points of learned information; cause and effect statements; opinions.

Silence or Confusion

10-1	Constructive.
10-2	Non-constructive.

The data from these categories were tabulated separately according to a system of time-use categories. The system of time-use categories also made use of arabic code symbols, but these numbers were placed in a special position and recorded in addition to the two-digit subscripted system. Changes in formation, purpose, and activity are relatively slow and such code symbols are recorded only when there is a change from the present circumstances. The Time-Use Categories are outlined below.

TIME-USE CATEGORIES--1966-67 VERSION

FORMATION

1. Total Class
2. Groups
3. Individuals

PURPOSE

1. Getting ready--getting students set for some activity or lesson; includes administrative routine, planning for immediate activities.
2. Discussion--teacher and/or students are talking about content or content-related material, but not purpose 3. Includes longer range planning (i.e., beyond that day).
3. Filling out content-related materials--such as workbooks, handwriting, drawing, copying, etc. Includes teacher and/or pupil talk based on the materials, but only if materials are being filled out during the time, not just used.
4. Reading--teacher and/or students are primarily reading, with very little discussion of the material.
5. Other--

ACTIVITY

1. Reading
2. Language Arts (other than reading)--spelling, writing, grammar.
3. Arithmetic
4. Science
5. Social Studies (includes geography)
6. Show and Tell
7. Other (for example, music, art, dance, miscellaneous chatter). Indicate the nature of the activity on the tally sheet.

The Basic Frequencies:--The basic frequencies are presented in 10 x 10 matrices on the next fifteen pages. The column and row titles indicate the basic category by the first digit only. The second digit, which is either a zero or a one, are artifacts of the computer program. The tenth category is designated by the arabic one to the right and near the bottom.

```
INTERACTION ANALYSIS - FREQUENCIES
TEACHER ONE, ALL OBSERVATIONS

------------------------------------------------------------------

CAT.     10   20   31   41   51   61   70   81   91    1.  TOTAL

------------------------------------------------------------------

10        0    0    0    0    0    0    0    0    0    0      0

20        0   24    7   14   37   30    2    9    9   28    160

31        0    4   60    9   27   13    2   26   33   33    207

41        0    4    0   57   39   20    9  272   13   28    442

51        0   12    1  134 1014  202   41  200  116  282   2002

61        0    3    1   24  107  194   35  100   60  194    718

70        0    0    1   14   31   23   74   27   17   91    278

81        0   68   53   65  270   64   21 1238   46  195   2020

91        0   25   82   35  192   28   27    3  252   91    735

 1        0   21    3   88  272  140   65  144  187 1827   2747

------------------------------------------------------------------

TOTAL     0  161  208  440 1989  714  276 2019  733 2769   9309

------------------------------------------------------------------
```

```
INTERACTION ANALYSIS - FREQUENCIES
TEACHER TWO, ALL OBSERVATIONS

---------------------------------------------------------------------

CAT.    10   20   31   41   51   61   70   81   91     1   TOTAL

---------------------------------------------------------------------

10       0    0    0    0    0    0    0    0    0    0       0
20       0   31    0    8    8   17    2    2    4   41     113
31       0    5   53   43   19   12    1   50   46   33     262
41       0    2    3  240   47   27   13  400   76  201    1009
51       0    9    2  131  567   59   14   87   23  161    1053
61       0    4    2   52   44  199   10   43   13  203     570
70       0    1    0   18   14   11   28    4    2   52     130
81       0   14  113  248  140   71    7  374   10  135    1112
91       0    5   84   41   33    6    4    0  274   37     484
 1       0   43    6  223  178  170   50  153   36 1403    2262

---------------------------------------------------------------------

TOTAL    0  114  263 1004 1050  572  129 1113  484 2266    6995

---------------------------------------------------------------------
```

```
INTERACTION ANALYSIS - FREQUENCIES
    TEACHER 03, ALL OBSERVATIONS

-----------------------------------------------------------------

CAT.    10    20    31    41    51    61    70    81    91     1  TOTAL

-----------------------------------------------------------------

10       0     1     0     0     0     0     0     0     0     0      1

20       0    20     7    18    59     9     2    11     6    19    151

31       0     8   108    24    47     5     2    13    11     2    220

41       0     7     8   453   102    28     8   299    31    47    983

51       1    39    18   256  2647   156    28   139    81   110   3475

61       0     7     3    24    98   360    12    53     7    93    657

70       0     0     0    11    42    13    74    13    13    20    186

81       0    49    45   138   224    33    18  1092    24    30   1653

91       0     6    30    18   118     4    12     2   279    12    481

 1       0    14     1    41   138    56    30    32    30   613    955

-----------------------------------------------------------------

TOTAL    1   151   220   983  3475   664   186  1654   482   946   8762

-----------------------------------------------------------------
```

```
INTERACTION ANALYSIS - FREQUENCIES
    TEACHER 04, ALL OBSERVATIONS

------------------ --------------------------------------------

CAT.     10    20    31    41    51    61    70    81    91     1  TOTAL

----------------------------------------------------------------

10        1     1     0     0     2     0     0     0     0     0      4
20        0    58     9    45    24    36     4     9    24    82    291
31        0    21    88    56    42    37     4    37    73   105    463
41        1     2     4   170    41    32    13   417    69   177    926
51        1    18     3   123   692    78    17   202    55   206   1395
61        0     5     0    32    43   295    14   103    30   387    909
70        0     3     2    15    18    20   193    12    23   135    421
81        0   101   180   174   226    58    18  1151    46   232   2186
91        0    41   150    47    91    47    41    11   641   141   1210
 1        1    40    27   264   216   305   117   244   249  1662   3125

----------------------------------------------------------------

TOTAL     4   290   463   926  1395   908   421  2186  1210  3127  10930

----------------------------------------------------------------
```

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 05, ALL OBSERVATIONS

CAT.	10	20	31	41	51	61	70	81	91		TOTAL
10	0	0	0	0	0	0	0	0	0	1	1
20	0	10	9	20	14	15	0	3	6	15	92
31	0	8	49	108	84	32	1	58	27	48	415
41	0	4	6	251	55	40	4	596	66	190	1212
51	0	4	3	255	1191	196	11	43	46	202	1951
61	0	2	0	47	109	363	16	113	47	410	1107
70	0	0	1	9	13	12	21	3	8	33	100
81	0	34	257	267	138	102	7	1269	22	179	2275
91	1	23	75	30	87	51	5	1	204	51	528
1	0	7	15	225	260	298	35	189	101	854	1984
TOTAL	1	92	415	1212	1951	1109	100	2275	527	1983	9665

```
INTERACTION ANALYSIS - FREQUENCIES
  TEACHER SIX,ALL OBSERVATIONS

-----------------------------------------------------------------------

CAT.     10    20    31    41    51    61    70    81    91     1   TOTAL

-----------------------------------------------------------------------

10        0     0     0     0     0     0     0     0     0     0       0

20        0    19     9    22    38    41     0    11    11    25     176

31        0    17    61    75    50    44     1    39    28    30     345

41        0     4     4    70    53    94     4   432    22    84     767

51        0    12     3   215   858   278     2   144   105   198    1815

61        0     7     2    55   121   255     7   334    79   291    1151

70        0     0     1     4     6     9     2     4     2    13      41

81        0    84   206   179   285   172     5  1108    38   109    2186

91        0    16    57    34   170    45     7     3   177    36     545

 1        0    18     3   112   222   207    13   111    82   835    1603

-----------------------------------------------------------------------

TOTAL     0   177   346   766  1803  1145    41  2186   544  1621    8629

-----------------------------------------------------------------------
```

INTERACTICN ANALYSIS - FREQUENCIES
TEACHER SEVEN, ALL CVSERVATICNS

CAT.	10	20	31	41	51	61	70	81	91	1	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0
20	0	7	2	14	14	10	3	2	3	11	66
31	0	4	56	128	50	19	9	51	23	40	380
41	0	3	2	274	36	40	8	398	68	135	964
51	0	3	1	159	931	89	25	123	16	148	1495
61	0	2	2	21	43	141	26	114	23	165	537
70	0	3	1	25	26	30	140	19	4	105	353
81	0	34	241	178	146	38	33	1251	0	153	2074
91	0	4	65	33	33	7	5	1	61	14	223
i	0	6	10	132	216	163	104	115	25	812	1583
TOTAL	0	66	380	964	1495	537	353	2074	223	1583	7675

```
INTERACTION ANALYSIS - FREQUENCIES
TEACHER EIGHT, ALL OBSERVATIONS

------------------------------------------------------------------------

CAT.     10   20   31   41   51   61   70   81   91    1    TOTAL

------------------------------------------------------------------------

10        0    0    0    0    0    0    0    0    1    0        1

20        0    6   13   17   16   18    0    3    1    5       79

31        0    3   93  109   62   33    5   44   19   29      397

41        0    1    3  189   31   29   15  679   43  205     1195

51        1    1    3  251  921  195   28  115   40  163     1718

61        0    2    1   71  129  407   20  119   33  224     1006

70        0    1    1   19   24   19  113   17   11   81      286

81        0   37  245  371  262  125   31  687   13  100     1871

91        0   23   31   28   75   23   17    4  220   14      435

 1        0    4    7  139  199  158   57  203   54  814     1635

------------------------------------------------------------------------

TOTAL     1   78  397 1194 1719 1007  286 1871  435 1635     8623

------------------------------------------------------------------------
```

```
INTERACTION ANALYSIS - FREQUENCIES
TEACHER NINE, ALL OBSERVATIONS

-------------------------------------------------------------------------

CAT.     10   20   31   41   51   61    70   81   91    1  TOTAL

-------------------------------------------------------------------------

10        0    0    0    0    0    0     0    0    0    0      0

20        0    9    3   22   23   38     0    2    0   12    109

31        0    3   65   23   38   27     2   86   10   29    283

41        0    6    2  168   61   52     0  342   19  148    798

51        0    3    5  195 1726  196    14  185   15  156   2495

61        0    1    1   41   89  133     3  302   43  203    816

70        0    0    0    6    5    9    30    3    1   26     80

81        0   77  157  228  300  146     7  807    9  175   1906

91        0    6   33   16   30   17     1   11  121   21    256

 1        0    4   17   99  223  198    23  168   38  774   1544

-------------------------------------------------------------------------

TOTAL     0  109  283  798 2495  816    80 1906  256 1544   8287

-------------------------------------------------------------------------
```

INTERACTION ANALYSIS - FREQUENCIES
TEACHER TEN, ALL OBSERVATIONS

CAT.	10	20	31	41	51	61	70	81	91	1	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0
20	0	13	3	46	64	54	5	8	13	35	241
31	0	24	26	45	42	40	1	12	20	16	226
41	0	28	3	191	175	109	12	618	45	149	1330
51	0	47	3	338	775	297	28	179	77	187	1931
61	0	13	4	88	118	208	19	414	58	213	1135
70	0	0	0	24	19	20	19	30	2	36	150
81	0	83	136	353	420	204	33	949	24	86	2288
91	0	9	47	44	106	34	6	4	334	70	654
1	0	26	4	195	202	168	26	75	80	530	1306
TOTAL	0	243	226	1324	1921	1134	149	2289	653	1322	9261

```
INTERACTION ANALYSIS - FREQUENCIES
TEACHER ELEVEN, ALL OBSERVATIONS

------------------------------------------------------------------

CAT.     10   20   31   41   51   61   70   81   91    1  TOTAL

------------------------------------------------------------------

10        0    0    0    0    0    0    0    0    0    0      0

20        0   74   65   75   97  100    4   27   27   30    499

31        0   24  119   84   71   48    1   47   50   26    470

41        0    4    1  218   65   48    1  612  113   78   1140

51        0   32   18  287 1693  330   16  242  153  197   2968

61        0   18    5   89  201  377   14  398   83  234   1419

70        0    0    0    8   15    9   18   15    3   27     95

81        0  253  146  245  413  270   17 1403   79  139   2965

91        0   78  107   34  211   83    8   46  255   62    884

 1        0   16    9   99  202  155   16  176  120  516   1309

------------------------------------------------------------------

TOTAL     0  499  470 1139 2968 1420   95 2966  883 1309  11749

------------------------------------------------------------------
```

```
INTERACTION ANALYSIS - FREQUENCIES
TEACHER FOURTEEN, ALL OBSERVATIONS

-------------------------------------------------------------------------

CAT.     10   20   31   41   51   61   70   81   91    1    TOTAL

-------------------------------------------------------------------------

10        0    0    0    0    0    0    0    0    0    0        0

20        0   20    5    8   29   12    4    5    4   27      114

31        0    5   35   14   47   14    4   41   39   14      213

41        0    1    2   74   35    9    7  217   21   41      407

51        0   21    5  134 1566  145   85  206   59  176     2397

61        0    6    2   12   76  166   35   63   16  141      517

70        0    2    0   20   83   21  199   23   10  126      484

81        0   29   90   84  264   39   21  447    4   68     1046

91        0    6   68    3   70    6   22    2  145   40      362

 1        0   24    6   58  227  105  107   42   64  455     1088

-------------------------------------------------------------------------

TOTAL     0  114  213  407 2397  517  484 1046  362 1088     6628

-------------------------------------------------------------------------
```

INTERACTION ANALYSIS - FREQUENCIES
TEACHER FIFTEEN, ALL OBSERVATIONS

CAT.	10	20	31	41	51	61	70	81	91	1	TOTAL
10	0	0	0	0	1	0	0	0	0	0	1
20	0	3	0	5	21	23	0	3	9	13	77
31	0	5	3	28	29	13	0	4	13	6	101
41	0	1	0	132	70	77	10	414	61	93	858
51	0	25	0	223	701	341	36	97	126	217	1766
61	0	8	0	123	236	384	33	140	84	227	1235
70	1	0	0	7	26	34	21	11	11	27	138
81	0	18	70	187	265	121	17	531	21	62	1292
91	0	6	27	49	205	81	2	7	104	26	507
1	0	11	1	104	212	161	19	85	78	411	1082
TOTAL	1	77	101	858	1766	1235	138	1292	507	1082	7057

```
INTERACTION ANALYSIS - FRECUENCIES
TEACHER SIXTEEN, ALL OBSERVATIONS

-----------------------------------------------------------------

CAT.     10   20   31   41   51   61   70   81   91    1   TOTAL

-----------------------------------------------------------------

10        0    0    0    1    0    0    0    1    0    1       3

20        0    5    2   26   12   25    0   17    6   31     124

31        0   16   28   98   43   30    0   77   20   50     362

41        1    3    0  230   34   28    3  569   44  158    1070

51        0    5    2  159  469  116    5   43   54  136     989

61        0    9    1   62   48  350    6  107   31  305     919

70        0    0    1    7   10    7   44    7    7   28     111

81        2   69  281  237  161  101    5  405   18  107    1386

91        0   10   39   23   83   34   18    4  133   51     395

 1        0    7    8  227  129  229   30  156   82  567    1435

-----------------------------------------------------------------

TOTAL     3  124  362 1070  989  920  111 1386  395 1434    6794

-----------------------------------------------------------------
```

```
INTERACTION ANALYSIS - FREQUENCIES
TEACHER SEVENTEEN, ALL OBSERVATIONS

------------------------------------------------------------------------

CAT.    10   20   31   41   51   61   70   81   91    1 .  TOTAL

------------------------------------------------------------------------

10       0    0    0    0    0    0    0    0    0    0       0
20       0   14    2   24   36   11    0   19   14   22     142
31       0   10   33   55   65   21    1    3   40    7     235
41       0    4    0  164  117   44    7  556  135  105    1132
51       0   18    2  378 1257  268   29  248  231  178    2609
61       0    3    0   73  201  235   12  107   64  102     797
70       0    2    0   13   38   15   14   16   10   18     126
81       0   62   99  241  409   67   20  732   42   89    1761
91       0   12  100   72  311   67   18    7  266   19     872
1        0   19    0  108  177   75   25   72   67  235     778

------------------------------------------------------------------------

TOTAL    0  144  236 1128 2611  803  126 1760  869  775    8452

------------------------------------------------------------------------
```

Basic Data as Probabilities:--The next fifteen pages present 10 x 10 matrices, one matrix for each teacher, based on the same data as the preceding matrices. However, cell frequencies and the column total at the bottom are based on a matrix total of 1,000 tallies. This is a millage matrix, as distinct from a percentage matrix, and direct comparisons can be made between cell frequencies and column totals because of the common base. The total number of raw tallies on which the millage matrix is based is also printed just below the matrix.

Some interaction analysis variables are also shown. "Big I/I+D" is a decimal number which is calculated by adding column totals for Categories 1 through 7. "Little I/I+D" is a decimal number which is calculated by columns 1 + 2 + 3 divided by 1 + 2 + 3 + 6 + 7. This latter ratio is sometimes called the revised ratio. The percent teacher talk and the percent pupil talk (called ST TALK) are self explanatory.

TEACHER ONE, ALL CBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	0	3	1	2	4	3	0	1	1	3
3	0	0	6	1 ✓	3 ✓	1	0	3	4	4
4	0	0	0 ✓	6	4	2	1	29	1 ✓	3
5	0	1	0 ✓	14	109	22	4	21	12	30
6	0	0	0	3	11	21	4	11	6	21
7	0	0	0	2	3	2	8	3	2	10
8	0	7	6 ✓	7	29	7	2	133	5	21
9	0	3	9	4 ✓	21 ✓	3	3	0	27	10
10	0	2	0	9	29	15	7	15	20	196
TOTAL	0	17	22	47	215	77	30	217	79	295

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 9309

SUMMARY DATA

BIG I/I+D	LITTLE I/I+D	PERCENT TCH TALK	PERCENT ST TALK
.213	.269	40.9	29.6

```
TEACHER TWO, ALL CBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY        1    2    3    4    5    6    7    8    9   10
  1             0    0    0    0    0    0    0    0    0    0
  2             0    4    0    1    1    2    0    0    1    6
  3             0    1    8    6    3    2    0    7    7    5
  4             0    0    0   34    7    4    2   57   11   29
  5             0    1    0   19   81    8    2   12    3   23
  6             0    1    0    7    6   28    1    6    2   29
  7             0    0    0    3    2    2    4    1    0    7
  8             0    2   16   35   20   10    1   53    1   19
  9             0    1   12    6    5    1    1    0   39    5
 10             0    6    1   32   25   24    7   22    5  201
OTAL            0   16   37  144  151   81   19  159   69  323
UMBER OF TALLIES ON WHICH MATRIX IS BASED IS  6995
                  SUMMARY DATA
IG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK
  .441        .349                44.8             22.8
```

```
   TEACHER 03, ALL OBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY          1    2    3    4    5    6    7    8    9   10

    1             0    0    0    0    0    0    0    0    0    0

    2             0    2    1    2    7    1    0    1    1    2

    3             0    1   12    3    5    1    0    1    1    0

    4             0    1    1   52   12    3    1   34    4    5

    5             0    4    2   29  302   18    3   16    9   13

    6             0    1    0    3   11   41    1    6    1   11

    7             0    0    0    1    5    1    8    1    1    2

    8             0    6    5   16   26    4    2  125    3    3

    9             0    1    3    2   13    0    1    0   32    1

   10             0    2    0    5   16    6    3    4    3   70

TOTAL             0   17   25  112  397   75   21  189   55  109

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  8762

                    SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .239        .306                64.7            24.4
   TEACHER 04, ALL OBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY            1    2    3    4    5    6    7    8    9   10

   1                0    0    0    0    0    0    0    0    0    0

   2                0    5    1    4    2    3    0    1    2    8

   3                0    2    8    5    4    3    0    3    7   10

   4                0    0    0   16    4    3    1   38    6   16

   5                0    2    0   11   63    7    2   18    5   19

   6                0    0    0    3    4   27    1    9    3   35

   7                0    0    0    1    2    2   18    1    2   12

   8                0    9   16   16   21    5    2  105    4   21

   9                0    4   14    4    8    4    4    1   59   13

  10                0    4    2   24   20   28   11   22   23  152

TOTAL               0   27   42   85  128   83   39  200  111  286

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 10930

                    SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .382        .363               40.3              31.1
   TEACHER 05, ALL OBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY        1    2    3    4    5    6    7    8    9   10

   1            0    0    0    0    0    0    0    0    0    0

   2            0    1    1    2    1    2    0    0    1    2

   3            0    1    5   11    9    3    0    6    3    5

   4            0    0    1   26    6    4    0   62    7   20

   5            0    0    0   26  123   20    1    4    5   21

   6            0    0    0    5   11   38    2   12    5   42

   7            0    0    0    1    1    1    2    0    1    3

   8            0    4   27   28   14   11    1  131    2   19

   9            0    2    8    3    9    5    1    0   21    5

  10            0    1    2   23   27   31    4   20   10   88

TOTAL           0   10   43  125  202  115   10  235   55  205

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  9665

                  SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

  .353        .296                 50.5             29.0
```

```
 TEACHER SIX,ALL OBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY        1    2    3    4    5    6    7    8    9   10

    1           0    0    0    0    0    0    0    0    0    0

    2           0    2    1    3    4    5    0    1    1    3

    3           0    2    7    9    6    5    0    5    3    3

    4           0    0    0    8    6   11    0   50    3   10

    5           0    1    0   25   99   32    0   17   12   23

    6           0    1    0    6   14   30    1   39    9   34

    7           0    0    0    0    1    1    0    0    0    2

    8           0   10   24   21   33   20    1  128    4   13

    9           0    2    7    4   20    5    1    0   21    4

   10           0    2    0   13   26   24    2   13   10   97

TOTAL           0   20   40   89  210  133    5  253   63  186

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  8629

                SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .300         .304                  49.8             31.6
```

TEACHER SEVEN, ALL OVSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	0	1	0	2	2	1	0	0	0	1
3	0	1	7	17	7	2	1	7	3	5
4	0	0	0	36	5	5	1	52	9	18
5	0	0	0	21	121	12	3	16	2	19
6	0	0	0	3	6	18	3	15	3	21
7	0	0	0	3	3	4	18	2	1	14
8	0	4	31	23	19	5	4	163	0	20
9	0	1	8	4	4	1	1	0	8	2
10	0	1	1	17	28	21	14	15	3	106
TOTAL	0	9	50	126	195	70	46	270	29	206

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 7675

SUMMARY DATA

BIG I/I+D	LITTLE I/I+D	PERCENT TCH TALK	PERCENT ST TALK
.372	.334	49.4	29.9

TEACHER EIGHT, ALL OBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	0	1	2	2	2	2	0	0	0	1
3	0	0	11	13	7	4	1	5	2	3
4	0	0	0	22	4	3	2	79	5	24
5	0	0	0	29	107	23	3	13	5	19
6	0	0	0	8	15	47	2	14	4	26
7	0	0	0	2	3	2	13	2	1	9
8	0	4	28	43	30	14	4	80	2	12
9	0	3	4	3	9	3	2	0	26	2
10	0	0	1	16	23	18	7	24	6	94
TOTAL	0	9	46	139	199	117	33	217	50	190

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 8623

SUMMARY DATA

BIG I/I+D	LITTLE I/I+D	PERCENT TCH TALK	PERCENT ST TALK
.357	.270	54.3	26.7

```
TEACHER NINE, ALL OBSERVATIONS
 PROBABILITIES TIMES 1000*

CATEGORY        1    2    3    4    5    6    7    8    9   10

    1           0    0    0    0    0    0    0    0    0    0

    2           0    1    0    3    3    5    0    0    0    1

    3           0    0    8    3    5    3    0   10    1    3

    4           0    1    0   20    7    6    0   41    2   18

    5           0    0    1   24  208   24    2   22    2   19

    6           0    0    0    5   11   16    0   36    5   24

    7           0    0    0    1    1    1    4    0    0    3

    8           0    9   19   28   36   18    1   97    1   21

    9           0    1    4    2    4    2    0    1   15    3

   10           0    0    2   12   27   24    3   20    5   93

 TOTAL          0   13   34   96  301   98   10  230   31  186

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  8287

                         SUMMARY DATA

 BIG I/I+D    LITTLE I/I+D    PERCENT TCH TALK    PERCENT ST TALK

    .260          .304                55.3              26.1
```

TEACHER TEN, ALL CBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	0	1	0	5	7	6	1	1	1	4
3	0	3	3	5	5	4	0	1	2	2
4	0	3	0	21	19	12	1	67	5	16
5	0	5	0	36	84	32	3	19	8	20
6	0	1	0	10	13	22	2	45	6	23
7	0	0	0	3	2	2	2	3	0	4
8	0	9	15	38	45	22	4	102	3	9
9	0	1	5	5	11	4	1	0	36	8
10	0	3	0	21	22	18	3	8	9	57
TOTAL	0	26	24	144	209	123	16	247	71	141

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 9261

SUMMARY DATA

BIG I/I+D	LITTLE I/I+D	PERCENT TCH TALK	PERCENT ST TALK
.358	.267	54.1	31.8

```
TEACHER ELEVEN, ALL OBSERVATIONS
 PROBABILITIES TIMES 1000*

CATEGORY        1    2    3    4    5    6    7    8    9   10

    1           0    0    0    0    0    0    0    0    0    0

    2           0    6    6    6    8    9    0    2    2    3

    3           0    2   10    7    6    4    0    4    4    2

    4           0    0    0   19    6    4    0   52   10    7

    5           0    3    2   24  144   28    1   21   13   17

    6           0    2    0    8   17   32    1   34    7   20

    7           0    0    0    1    1    1    2    1    0    2

    8           0   22   12   21   35   23    1  119    7   12

    9           0    7    9    3   18    7    1    4   22    5

   10           0    1    1    8   17   13    1   15   10   44

TOTAL           0   42   40   97  253  121    8  252   75  111

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 11749

                  SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

  .320         .390                  56.1             32.8
```

```
TEACHER FOURTEEN, ALL OBSERVATIONS
 PROBABILITIES TIMES 1000*

CATEGORY          1    2    3    4    5    6    7    8    9   10

    1             0    0    0    0    0    0    0    0    0    0

    2             0    3    1    1    4    2    1    1    1    4

    3             0    1    5    2    7    2    1    6    6    2

    4             0    0    0   11    5    1    1   33    3    6

    5             0    3    1   20  236   22   13   31    9   27

    6             0    1    0    2   11   25    5   10    2   21

    7             0    0    0    3   13    3   30    3    2   19

    8             0    4   14   13   40    6    3   67    1   10

    9             0    1   10    0   11    1    3    0   22    6

   10             0    4    1    9   34    16   16    6   10   69

TOTAL             0   17   32   61  362   78   73  158   55  164

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  6628

                 SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .178          .246               62.3              21.2
```

```
TEACHER FIFTEEN, ALL OBSERVATIONS
 PROBABILITIES TIMES 1000*

CATEGORY        1    2    3    4    5    6    7    8    9   10

   1            0    0    0    0    0    0    0    0    0    0

   2            0    0    0    1    3    3    0    0    1    2

   3            0    1    0    4    4    2    0    1    2    1

   4            0    0    0   19   10   11    1   59    9   13

   5            0    4    0   32   99   48    5   14   18   31

   6            0    1    0   17   33   54    5   20   12   32

   7            0    0    0    1    4    5    3    2    2    4

   8            0    3   10   26   38   17    2   75    3    9

   9            0    1    4    7   29   11    0    1   15    4

  10            0    2    0   15   30   23    3   12   11   58

TOTAL           0   11   14  122  250  175   20  183   72  153

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  7057

                         SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

  .248         .115                 59.2             25.5
```

```
TEACHER SIXTEEN, ALL OBSERVATIONS
 PROBABILITIES TIMES 1000*

 CATEGORY          1    2    3    4    5    6    7    8    9   10

    1              0    0    0    0    0    0    0    0    0    0

    2              0    1    0    4    2    4    0    3    1    5

    3              0    2    4   14    6    4    0   11    3    7

    4              0    0    0   34    5    4    0   84    6   23

    5              0    1    0   23   69   17    1    6    8   20

    6              0    1    0    9    7   52    1   16    5   45

    7              0    0    0    1    1    1    6    1    1    4

    8              0   10   41   35   24   15    1   60    3   16

    9              0    1    6    3   12    5    3    1   20    8

   10              0    1    1   33   19   34    4   23   12   83

 TOTAL             0   18   53  157  146  135   16  204   58  211

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  6794

                      SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK    PERCENT ST TALK

    .436         .322                  52.7               26.2
```

TEACHER SEVENTEEN, ALL OBSERVATIONS
PROBABILITIES TIMES 1000*

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	0	2	0	3	4	1	0	2	2	3
3	0	1	4	7	8	2	0	0	5	1
4	0	0	0	19	14	5	1	66	16	12
5	0	2	0	45	149	32	3	29	27	21
6	0	0	0	9	24	28	1	13	8	12
7	0	0	0	2	4	2	2	2	1	2
8	0	7	12	29	48	8	2	87	5	11
9	0	1	12	9	37	8	2	1	31	2
10	0	2	0	13	21	9	3	9	8	28
TOTAL	0	17	28	134	309	94	15	208	103	92

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 8452

SUMMARY DATA

BIG I/I+D	LITTLE I/I+D	PERCENT TCH TALK	PERCENT ST TALK
.299	.290	59.6	31.2

Probability Matrices for 22 Categories:--The next fifteen pages show 22 x 22 matrices, one for each teacher. The matrices, like the preceding set, show cell frequencies per 1,000 events, so that comparisons can be made with cells and column totals between matrices. The total number of tallies on which each matrix is based is shown at the bottom of each page. The Level One and Level Two indices show the percent of all events which were classified at each level. Levels 2 and 3 refer to the subscripts for Categories 4, 5, 8, and 9. The larger these numbers are, the higher the proportion of statements at higher levels of abstraction.

Basic frequencies for the 22 x 22 matrices are not included in Volume II because of limited space; only the probabilities per 1,000 are included.

```
TEACHER ONE ALL OBSERVATIONS
 PROBABILITIES TIMES 1000*

CATEGORY      10   20   31   32   33   41   42   43   51   52   53   61   62    0   81   82   83   91   92   93    1    2
  10           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  20           0    3    0    0    0    1    1    0    4    0    0    3    0    0    1    0    0    1    0    0    3    0
  31           0    0    0    1    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  32           0    0    0    3    2    0    0    0    2    0    0    1    0    0    0    0    0    2    0    0    2    1
  33           0    0    0    1    0    0    0    0    1    0    0    0    0    0    2    0    0    2    0    0    1    0
  41           0    0    0    0    0    5    0    0    4    0    0    2    0    1   24    0    0    1    0    0    2    0
  42           0    0    0    0    0    0    1    0    1    0    0    0    0    0    0    4    0    0    0    0    1    0
  43           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51           0    1    0    0    0   12    2    0  108    0    0   22    0    4   21    1    0   12    0    0   28    3
  52           0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    0    0    0    0    0
  53           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61           0    0    0    0    0    2    0    0   11    0    0   20    0    4   10    0    0    6    0    0   17    3
  62           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0
  70           0    0    0    0    0    1    0    0    3    0    0    2    0    8    3    0    0    2    0    0    9    1
  81           0    6    1    2    2    5    1    0   27    0    0    6    0    2  131    0    0    5    0    0   19    1
  82           0    1    0    1    0    0    0    0    2    0    0    1    0    0    0    2    0    0    0    0    1    0
  83           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91           0    2    1    5    2    3    0    0   20    0    0    3    0    3    0    0    0   25    1    0    8    2
  92           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0
  93           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1           0    2    0    0    0    7    1    0   27    0    0   13    0    6   15    0    0   17    0    0  154    1
   2           0    0    0    0    0    1    0    0    2    0    0    1    0    1    0    0    0    3    0    0    1   41
TOTAL          0   17    2   13    7   40    7    0  214    1    0   76    1   30  209    8    0   76    3    0  244   51

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  9309

PERCENT LEVEL 2 =  1.89       PERCENT LEVEL 3 =   .00
```

```
TEACHER TWO ALL OBSERVATIONS
 PROBABILITIES TIMES 1000*

CATEGORY      10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2

  10      -    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  20           0    4    0    0    0    1    0    0    1    0    0    2    0    0    0    0    0    1    0    0    6    0
  31           0    0    0    0    1    3    0    0    1    0    0    1    0    0    1    0    0    1    0    0    1    0
  32           0    0    0    3    1    2    0    0    1    0    0    1    0    0    1    0    0    1    0    0    2    0
  33           0    0    0    1    3    1    0    0    1    0    0    0    0    0    5    0    0    5    0    0    2    0
  41           0    0    0    0    0   30    0    0    6    0    0    4    0    1   53    0    0   11    0    0   26    0
  42           0    0    0    0    0    0    4    0    0    0    0    0    0    1    0    4    0    0    0    0    2    0
  43           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51           0    1    0    0    0   16    2    0   78    0    0    8    0    2   12    0    0    3    0    0   22    0
  52           0    0    0    0    0    0    0    0    0    3    0    0    0    0    0    0    0    0    0    0    0    0
  53           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61           0    1    0    0    0    7    0    0    6    0    0   28    0    1    6    0    0    2    0    0   28    1
  62           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  70           0    0    0    0    0    2    0    0    2    0    0    2    0    4    1    0    0    0    0    0    6    2
  81           0    2    7    3    5   33    0    0   18    0    0   10    0    1   52    0    0    1    0    0   18    0
  82           0    0    0    0    0    0    2    0    1    0    0    0    0    0    0    1    0    0    0    0    1    0
  83           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91           0    1    1    4    7    6    0    0    4    0    0    1    0    1    0    0    0   39    0    0    5    0
  92           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  93           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1           0    6    0    0    0   29    2    0   25    1    0   24    0    5   21    1    0    5    0    0  181    2
   2           0    0    0    0    0    1    0    0    0    0    0    1    0    2    0    0    0    0    0    0    1   17
TOTAL          0   16    8   12   18  134   11    0  147    4    0   81    0   19  153    5    1   69    0    0  302   22

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  6995

PERCENT LEVEL 2 =  2.03       PERCENT LEVEL 3 =   .09
```

ALL OBSERVATIONS, TEACHER 03
PROBABILITIES TIMES 1000.

CATEGORY	10	20	31	32	33	41	42	43	51	52	53	61	62	70	81	82	83	91	92	93	1	2
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	2	0	0	0	2	0	0	7	0	0	1	0	0	1	0	0	1	0	0	2	0
31	0	0	3	2	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	3	0	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0
33	0	0	0	0	3	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
41	0	1	0	0	0	12	2	0	10	0	0	3	0	1	28	0	0	2	0	0	4	0
42	0	0	0	0	0	0	6	0	1	0	0	0	0	0	0	5	0	0	1	0	1	0
43	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	0	4	1	1	1	25	3	0	282	1	0	17	0	3	14	0	0	8	1	0	11	1
52	0	0	0	0	0	0	1	1	0	12	0	1	0	0	0	1	0	0	0	0	1	0
53	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
61	0	1	0	0	0	2	0	0	9	0	0	35	4	1	6	0	0	1	0	0	9	0
62	0	0	0	0	0	0	0	0	2	0	0	1	2	0	0	0	0	0	0	0	1	0
70	0	0	0	0	0	1	0	0	5	0	0	1	0	8	1	0	0	1	0	0	2	0
81	0	5	3	0	1	13	0	0	23	0	0	3	0	2	119	0	0	2	0	0	3	0
82	0	1	0	0	0	0	2	0	1	1	0	1	0	0	0	4	0	0	1	0	0	0
83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
91	0	0	1	0	0	1	0	0	11	0	0	0	0	1	0	0	0	23	1	0	1	0
92	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6	0	0	0
93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
1	0	2	0	0	0	4	1	0	14	0	0	6	0	3	3	1	0	3	0	0	61	1
2	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	8
TOTAL	0	17	10	8	8	93	16	2	374	17	5	69	6	21	175	12	2	42	11	3	98	11

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 8762

PERCENT LEVEL 2 = 5.58 PERCENT LEVEL 3 = 1.30

```
ALL OBSERVATIONS, TEACHER 04
 PROBABILITIES TIMES 1000*

CATEGORY      10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2
  10           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  20           0    6    0    0    0    3    1    0    2    0    0    3    0    0    1    0    0    2    0    0    8    0
  31           0    1    0    1    1    3    0    0    2    0    0    1    0    0    0    0    0    1    0    0    4    0
  32           0    0    0    3    1    1    0    0    1    0    0    1    0    0    0    0    0    3    0    0    4    0
  33           0    0    0    1    2    1    0    0    1    0    0    1    0    0    3    0    0    3    0    0    1    0
  41           0    0    0    0    0   12    0    0    2    0    0    3    0    1   29    1    0    6    0    0   13    0
  42           0    0    0    0    0    0    3    0    0    1    0    0    0    0    1    8    0    0    0    0    3    0
  43           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51           0    2    0    0    0    7    2    0   58    1    0    7    0    1   17    0    0    5    0    0   18    0
  52           0    0    0    0    0    0    2    0    1    4    0    0    0    0    0    1    0    0    0    0    1    0
  53           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61           0    0    0    0    0    3    0    0    4    0    0   25    2    1    9    0    0    3    0    0   35    0
  62           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0
  70           0    0    0    0    0    1    0    0    2    0    0    2    0   18    1    0    0    2    0    0   12    0
  81           0    8    8    2    3   12    2    0   19    0    0    5    0    2  104    0    0    4    0    0   18    0
  82           0    2    3    0    0    1    2    0    1    1    0    1    0    0    0    1    0    0    0    0    3    0
  83           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91           0    4    2    6    5    4    0    0    8    0    0    4    0    4    1    0    0   58    0    0   13    0
  92           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  93           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1           0    4    0    1    1   20    5    0   19    1    0   28    0   11   19    3    0   23    0    0  152    0
   2           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
TOTAL          0   27   15   15   13   67   17    0  119    9    0   81    2   39  185   15    0  110    1    0  285    1
NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 10930
PERCENT LEVEL 2 =  4.19       PERCENT LEVEL 3 =   .00
```

```
ALL OBSERVATIONS, TEACHER C5
 PROBABILITIES TIMES 1000*

CATEGORY     10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2

  10          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

  20          0    1    0    0    0    2    0    0    1    0    0    2    0    0    0    0    0    1    0    0    2    0

  31          0    1    0    1    1    5    2    0    5    0    0    2    0    0    0    0    0    1    0    0    2    0

  32          0    0    0    1    1    2    0    0    3    0    0    1    0    0    0    0    0    1    0    0    2    0

  33          0    0    0    1    1    1    0    0    1    0    0    1    0    0    5    0    0    1    0    0    1    0

  41          0    0    0    0    0   16    1    0    5    0    0    3    0    0   42    0    0    6    0    0   14    0

  42          0    0    0    0    0    1    7    0    1    0    0    1    0    0    1   17    0    0    1    0    5    0

  43          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0    0

  51          0    0    0    0    0   16    8    0  113    2    0   19    0    1    4    0    0    4    0    0   20    0

  52          0    0    0    0    0    1    2    0    1    7    0    1    0    0    0    0    0    0    0    0    1    0

  53          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

  61          0    0    0    0    0    3    1    0   11    1    0   35    2    2   11    1    0    4    0    0   41    0

  62          0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    0    1    0

  70          0    0    0    0    0    1    0    0    1    0    0    1    0    2    0    0    0    1    0    0    3    0

  81          0    3   11    3    4   18    3    0   10    0    0    9    0    1  130    0    0    2    0    0   17    0

  82          0    1    5    1    1    2    5    0    3    1    0    1    0    0    0    2    0    0    0    0    1    0

  83          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

  91          0    2    2    3    3    2    1    0    9    0    0    5    0    1    0    0    0   20    0    0    5    0

  92          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0    1    0

  93          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

   1          0    1    0    1    1   18    5    0   26    0    0   31    0    4   16    3    0   10    0    0   88    0

   2          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

TOTAL         0   10   19   11   12   88   36    2  190   12    0  112    2   10  211   23    1   52    2    0  204    1

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  5665

PERCENT LEVEL 2 =  7.40       PERCENT LEVEL 3 =   .33
```

```
ALL OBSERVATIONS, TEACHER 06
 PROBABILITIES TIMES 1000*

CATEGORY      10  20  31  32  33  41  42  43  51  52  53  61  62  70  81  82  83  91  92  93   1   2

  10           0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  20           0   2   1   0   0   3   0   0   4   0   0   5   0   0   1   0   0   1   0   0   3   0
  31           0   2   0   2   2   6   1   0   4   0   0   4   0   0   0   0   0   1   0   0   3   0
  32           0   0   0   1   1   2   0   0   1   0   0   1   0   0   1   0   0   1   0   0   0   0
  33           0   0   0   0   0   0   0   0   0   0   0   0   0   0   3   0   0   1   0   0   0   0
  41           0   0   0   0   0   7   0   0   6   0   0   9   0   0  43   0   0   2   0   0   9   0
  42           0   0   0   0   0   0   1   0   0   0   0   1   0   0   0   6   0   0   0   0   1   0
  43           0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  51           0   1   0   0   0  22   3   0  99   0   0  32   0   0  16   0   0  12   0   0  23   0
  52           0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  53           0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  61           0   1   0   0   0   5   1   0  14   0   0  28   0   1  37   1   0   9   0   0  33   0
  62           0   0   0   0   0   0   0   0   0   0   0   0   1   0   0   0   0   0   0   0   0   0
  70           0   0   0   0   0   0   0   0   1   0   0   1   0   0   0   0   0   0   0   0   2   0
  81           0   9  18   1   2  17   2   0  31   0   0  19   0   1 128   0   0   4   0   0  12   0
  82           0   1   2   0   0   1   1   0   2   0   0   1   0   0   0   0   0   0   0   0   1   0
  83           0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  91           0   2   3   2   1   3   0   0  20   0   0   5   0   1   0   0   0  20   0   0   4   0
  92           0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   1   0   0   0
  93           0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
   1           0   2   0   0   0  12   1   0  25   0   0  24   0   2  12   1   0  10   0   0  97   0
   2           0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
TOTAL          0  20  25   8   7  78  11   0 210   0   0 131   2   5 243  10   0  62   2   0 186   0
NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  8629
PERCENT LEVEL 2 =  2.24      PERCENT LEVEL 3 =   .00
```

```
ALL OBSERVATIONS, TEACHER 07
 PROBABILITIES TIMES 1000*

CATEGORY      10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2

 10            0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

 20            0    1    0    0    0    2    0    0    2    0    0    1    0    0    0    0    0    0    0    0    1    0

 31            0    0    0    1    1    7    0    0    4    0    0    1    0    1    0    0    0    1    0    0    3    0

 32            0    0    0    2    1    6    1    0    2    0    0    1    0    0    1    0    0    1    0    0    1    0

 33            0    0    0    1    2    1    0    0    1    0    0    0    0    0    4    1    1    1    0    0    1    0

 41            0    0    0    0    0   26    0    0    4    0    0    4    0    1   39    2    1    8    0    0   15    0

 42            0    0    0    0    0    1    8    0    1    0    0    1    0    0    0    8    0    0    0    0    3    0

 43            0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    0    1    0    0    1    0    0

 51            0    0    0    0    0   15    4    1  120    0    0   11    0    3   16    0    0    2    0    0   19    0

 52            0    0    0    0    0    0    1    0    0    1    0    1    0    0    0    0    0    0    0    0    0    0

 53            0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

 61            0    0    0    0    0    2    0    0    5    0    0   18    0    3   13    2    0    3    0    0   21    0

 62            0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

 70            0    0    0    0    0    3    1    0    3    0    0    4    0   18    2    0    0    1    0    0   13    1

 81            0    4   13    7    4   17    1    0   17    0    0    5    0    4  161    0    0    0    0    0   19    0

 82            0    0    2    3    2    1    3    0    1    1    0    0    0    0    0    1    0    0    0    0    1    0

 83            0    0    1    0    1    0    0    1    0    0    0    0    0    0    0    0    1    0    0    0    0    0

 91            0    1    2    3    2    4    0    0    4    0    0    1    0    1    0    0    0    8    0    0    2    0

 92            0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

 93            0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

  1            0    1    1    0    1   15    2    0   28    0    0   21    0   13   14    1    0    3    0    0  103    1

  2            0    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    2

TOTAL          0    9   19   17   13  100   22    4  192    3    0   70    0   46  251   16    4   27    1    1  203    3

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  7675

PERCENT LEVEL 2 =  4.16      PERCENT LEVEL 3 =   .86
```

```
ALL OBSERVATIONS, TEACHER C8
 PROBABILITIES TIMES 1000*

CATEGORY     10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2

  10          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
 _20          0    1    1    1    0    2    0    0    2    0    0    2    0    0    0    0    0    0    0    0    1    0
  31          0    0    1    1    2    7    1    0    4    0    0    3    0    0    0    0    0    0    0    0    2    0
  32          0    0    0    5    1    5    0    0    3    0    0    1    0    0    0    0    0    1    0    0    1    0
 _33          0    0    0    0    1    0    0    0    0    0    0    0    0    0    4    0    0    1    0    0    1    0
  41          0    0    0    0    0   19    1    0    3    0    0    3    0    2   72    1    0    5    0    0   23    0
  42          0    0    0    0    0    0    2    0    0    0    0    0    0    0    0    6    0    0    0    0    0    0
 _43          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51          0    0    0    0    0   26    2    0  101    1    0   22    0    3   13    0    0    4    0    0   17    1
  52          0    0    0    0    0    0    0    0    0    5    0    0    0    0    0    0    0    0    0    0    0    0
 _53          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61          0    0    0    0    0    8    0    0   14    0    0   46    1    2   14    0    0    4    0    0   24    1
  62          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
 _70          0    0    0    0    0    2    0    0    3    0    0    2    0   13    2    0    0    1    0    0    9    1
  81          0    3   16    8    3   39    2    0   27    0    0   14    0    3   77    0    0    1    0    0   11    0
  82          0    1    1    0    0    1    1    0    2    0    0    0    0    0    0    3    0    0    0    0    0    0
 _83          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91          0    3    1    1    1    3    0    0    8    0    0    3    0    2    0    0    0   24    0    0    1    0
  92          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0
  93          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1          0    0    0    0    0   15    0    0   21    0    0   17    0    6   22    1    0    6    0    0   85    2
   2          0    0    0    0    0    1    0    0    2    0    0    1    0    1    0    0    0    0    0    0    1    7
TOTAL         0    9   21   16    9  129   10    0  192    7    0  115    1   33  206   11    0   48    2    0  177   13

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  8623

PERCENT LEVEL 2 =  3.02       PERCENT LEVEL 3 =   .05
```

```
ALL OBSERVATIONS, TEACHER 09
 PROBABILITIES TIMES 1000*

CATEGORY    10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2

  10         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  20         0    1    0    0    0    1    1    0    2    1    0    5    0    0    0    0    0    0    0    0    1    0
  31         0    0    0    0    0    1    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  32         0    0    0    4    1    1    0    0    3    0    0    2    0    0    2    0    0    0    0    0    1    0
  33         0    0    0    0    2    0    0    0    0    0    0    1    0    0    4    4    0    1    0    0    2    0
  41         0    1    0    0    0   13    1    0    5    0    0    4    0    0   24    1    0    2    0    0   12    0
  42         0    0    0    0    0    0    7    0    1    1    0    2    0    0    0   16    0    0    0    0    6    0
  43         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51         0    0    0    0    0   15    5    0  187    2    0   21    0    1   17    3    0    2    0    0   17    0
  52         0    0    0    0    0    0    3    0    3   16    0    2    0    0    0    2    0    0    0    0    1    0
  53         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61         0    0    0    0    0    3    2    0   10    0    0   15    0    0   25   11    0    4    1    0   24    0
  62         0    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    0    0
  70         0    0    0    0    0    0    0    0    0    0    0    1    0    4    0    0    0    0    0    0    3    0
  81         0    4    1    4    4   16    3    0   25    0    0   10    0    0   81    3    0    1    0    0   17    0
  82         0    5    1    4    4    1    7    0    5    5    0    8    0    0    1   12    0    0    0    0    4    0
  83         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91         0    1    0    3    1    2    0    0    3    0    0    1    0    0    1    0    0   14    0    0    3    0
  92         0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    1    0    0    0
  93         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1         0    0    0    1    1    9    3    0   25    2    0   24    0    3   15    5    0    4    0    0   93    0
   2         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0

TOTAL        0   13    3   17   14   63   34    0  272   29    0   97    1   10  172   58    0   29    2    0  186    0

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  8287

PERCENT LEVEL 2 = 12.28      PERCENT LEVEL 3 =   .00
```

```
ALL OBSERVATIONS, TEACHER 10
 PROBABILITIES TIMES 1000*

CATEGORY      10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2
  10           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  20           0    2    0    0    0    4    1    0    7    0    0    6    0    1    1    0    0    1    0    0    4    0
  31           0    2    0    1    1    4    0    0    3    0    0    3    0    0    0    0    0    0    0    0    1    0
  32           0    0    0    1    0    1    0    0    1    0    0    1    0    0    0    0    0    0    0    0    0    0
  33           0    0    0    0    0    0    0    0    1    0    0    0    0    0    1    0    0    2    0    0    0    0
  41           0    3    0    0    0   19    1    0   18    0    0   11    0    1   58    1    0    5    0    0   14    0
  42           0    0    0    0    0    0    0    0    1    0    0    0    0    0    1    7    0    0    0    0    2    0
  43           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51           0    5    0    0    0   34    2    0   82    1    0   32    0    3   19    1    0    8    0    0   20    0
  52           0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    0    0    0    0    0
  53           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61           0    1    0    0    0    9    0    0   13    0    0   21    0    2   40    4    0    6    0    0   23    0
  62           0    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    0    0
  70           0    0    0    0    0    2    0    0    2    0    0    2    0    2    3    0    0    0    0    0    4    0
  81           0    6   12    1    1   29    3    0   42    0    0   21    0    3  101    0    0    2    0    0    9    0
  82           0    2    1    0    0    3    3    0    3    0    0    1    0    0    0    2    0    0    0    0    0    0
  83           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91           0    1    1    2    2    4    0    0   11    0    0    4    0    1    0    0    0   35    0    0    8    0
  92           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  93           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1           0    3    0    0    0   20    1    0   22    0    0   17    1    3    8    0    0    9    0    0   57    0
   2           0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
TOTAL          0   26   15    5    5  132   12    0  207    2    0  121    2   16  232   16    0   69    1    0  140    1
NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  9261

PERCENT LEVEL 2 =  3.03      PERCENT LEVEL 3 =   .00
```

```
ALL OBSERVATIONS, TEACHER 11
 PROBABILITIES TIMES 1000*

CATEGORY    10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2
  10         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  20         0    6    3    2    1    4    2    0    8    0    0    9    0    0    2    0    0    2    1    0    3    0
  31         0    2    1    2    0    3    2    0    1    0    0    2    0    0    0    0    0    1    0    0    1    0
  32         0    0    0    5    1    2    1    0    3    1    0    2    0    0    0    0    0    1    0    0    1    0
  33         0    0    0    0    1    0    0    0    0    0    0    0    0    0    3    0    0    1    0    0    1    0
  41         0    0    0    0    0   11    1    0    4    0    0    3    0    0   36    1    0    6    2    0    4    0
  42         0    0    0    0    0    1    5    0    1    0    0    1    0    0    2   13    0    0    2    0    2    0
  43         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51         0    2    0    1    0   18    3    0  124    5    0   27    0    1   17    1    0   12    1    0   15    0
  52         0    0    0    0    0    1    2    0    2   13    0    1    0    0    2    1    0    0    0    0    1    0
  53         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61         0    2    0    0    0    6    2    0   16    1    0   30    2    1   32    2    0    6    1    0   20    0
  62         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  70         0    0    0    0    0    1    0    0    1    0    0    1    0    2    1    0    0    0    0    0    2    0
  81         0   14    5    3    1   10    6    0   30    2    0   21    0    1  116    1    0    6    0    0   11    0
  82         0    8    2    1    1    2    3    0    2    1    0    2    0    0    0    2    0    0    0    0    1    0
  83         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91         0    3    2    4    2    2    0    0   16    0    0    7    0    1    3    1    0   15    0    0    5    0
  92         0    3    1    0    0    0    0    0    1    1    0    0    0    0    0    0    0    0    6    0    0    0
  93         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1         0    1    0    1    0    8    1    0   16    1    0   13    0    1   13    2    0    9    0    0   42    1
   2         0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    2
TOTAL        0   42   14   17    8   69   28    0  227   25    0  119    2    8  227   26    0   61   14    0  109    3
NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 11750
PERCENT LEVEL 2 =  5.30      PERCENT LEVEL 3 =   .07
```

```
ALL CESERVATIONS, TEACFER 14
 PROBAEILITIES TIMES 1000*

 CATEGCRY      10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2

   10           C    C    0    0    0    0    C    0    0    0    0    0    0    0    C    C    0    0    0    0    0    0
  _20           0    3    0    0    1    1    C    0    4    0    0    2    0    1    0    0    0    1    0    C    4    0
   31           0    0    C    0    1    1    0    0    4    0    0    2    0    0    0    0    0    0    0    C    C    0
   32           0    0    0    2    2    1    0    0    2    0    0    0    0    0    0    0    0    1    0    C    0    0
  _33           0    0    0    0    1    C    0    0    1    0    0    0    C    0    5    1    0    5    0    C    1    0
   41           0    0    0    0    0    9    C    0    4    0    0    1    0    1   3C    C    0    3    0    0    5    0
   42           0    0    0    0    0    0    2    C    1    0    0    0    0    0    C    2    0    0    0    0    1    0
  _43           C    C    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   51           0    3    0    0    C   17    3    0  225    1    0   22    0   13   31    0    0    9    0    0   23    3
   52           0    0    0    0    C    1    0    0    1    5    C    0    0    0    0    0    0    0    0    C    0    0
  _53           0    0    0    0    C    0    0    0    0    0    0    0    0    0    0    0    0    0    0    C    C    0
   61           0    1    0    0    0    2    C    0   11    0    0   24    0    5    5    0    0    2    0    0   21    1
   62           C    0    0    0    0    0    C    C    0    0    0    0    0    0    C    0    0    0    0    0    0    0
  _70           C    C    C    0    0    2    1    0   13    0    0    3    0   30    3    C    0    2    0    0   17    2
   81           0    3    7    1    3   12    0    0   39    0    C    6    0    3   66    0    0    1    0    0   10    0
   82           0    1    1    0    1    0    0    0    1    0    0    0    0    0    0    1    0    0    0    C    0    0
  _83           0    0    0    0    C    C    0    0    0    0    0    0    0    0    0    0    0    0    0    C    C    0
   91           0    1    1    5    5    0    C    0   11    0    0    1    0    3    C    0    0   22    0    C    5    2
   92           C    0    0    0    0    0    C    C    C    0    0    0    0    0    C    0    0    0    0    0    0    0
   93           0    C    C    0    C    0    0    0    C    0    0    0    0    0    C    0    0    C    0    0    0    0
    1           0    4    0    0    C    7    1    0   33    0    0   16    0   11    6    0    0    9    0    C   57    1
    2           0    0    0    0    C    C    0    0    1    0    0    0    0    5    0    0    0    1    0    0    1   10
 TCTAL          C   17    9    9   14   53    8    0  354   7..   0   77    1   73  151    6    0   55    0    0  146   18

 NUMBER CF TALLIES ON WHICH MATRIX IS BASED IS  6628

 PERCENT LEVEL 2 =  2.17      PERCENT LEVEL 3 =   .0C
```

```
ALL OBSERVATIONS, TEACHER 15
 PROBABILITIES TIMES 1000*

CATEGORY     10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2

  10          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  20          0    0    0    0    0    1    0    0    3    0    0    3    0    0    0    0    0    1    0    0    2    0
  31          0    1    0    0    0    3    0    0    3    0    0    1    0    0    0    0    0    1    0    0    0    0
  32          0    0    0    0    0    1    0    0    1    0    0    1    0    0    0    0    0    1    0    0    0    0
  33          0    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0
  41          0    0    0    0    0   18    0    0   10    0    0   10    0    1   55    0    0    8    1    0   11    1
  42          0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    4    0    0    0    0    1    0
  43          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51          0    4    0    0    0   30    1    0   98    0    0   48    0    5   13    0    0   18    0    0   28    3
  52          0    0    0    0    0    0    0    0    0    1    0    1    0    0    0    0    0    0    0    0    0    0
  53          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61          0    1    0    0    0   17    1    0   33    0    0   52    2    5   19    1    0   11    0    0   26    6
  62          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  70          0    0    0    0    0    1    0    0    4    0    0    5    0    3    1    0    0    1    0    0    3    1
  81          0    2    6    3    1   23    2    0   35    0    0   16    0    2   74    1    0    3    0    0    8    1
  82          0    0    1    0    0    1    1    0    2    1    0    1    0    0    0    1    0    0    0    0    0    0
  83          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91          0    1    2    1    1    6    0    0   28    0    0   11    0    0    1    0    0   11    1    0    3    1
  92          0    0    1    0    0    1    0    0    1    0    0    0    0    0    0    0    0    0    2    0    0    0
  93          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1          0    1    0    0    0   12    1    0   26    0    0   19    0    2   11    1    0   10    0    0   48    1
   2          0    0    0    0    0    2    0    0    4    0    0    4    0    1    1    0    0    1    0    0    0    9
TOTAL         0   11    9    4    2  115    7    0  246    3    0  173    2   20  176    7    0   67    5    0  132   21

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  7057

PERCENT LEVEL 2 =  2.13       PERCENT LEVEL 3 =   .00
```

```
ALL OBSERVATIONS, TEACHER 16
 PROBABILITIES TIMES 1000*

CATEGORY     10   20   31   32   33   41   42   43   51   52   53   61   62   70   81   82   83   91   92   93    1    2

  10          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  20          0    1    0    0    0    3    1    0    1    0    0    4    0    0    1    1    0    1    0    0    5    0
  31          0    2    0    1    0    9    2    0    4    0    0    4    0    0    1    1    0    1    0    0    5    0
  32          0    1    0    1    0    2    1    0    1    0    0    1    0    0    0    0    0    1    0    0    1    0
  33          0    0    0    0    1    1    0    0    1    0    0    0    0    0    8    0    0    1    0    0    1    0
  41          0    0    0    0    0   28    1    0    4    0    0    4    0    0   71    1    0    6    0    0   20    0
  42          0    0    0    0    0    0    4    0    1    0    0    0    0    0    2    9    0    0    0    0    4    0
  43          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  51          0    1    0    0    0   20    2    0   65    1    0   16    0    1    5    1    0    8    0    0   20    0
  52          0    0    0    0    0    0    1    0    1    3    0    1    0    0    0    0    0    0    0    0    0    0
  53          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  61          0    1    0    0    0    8    0    0    7    0    0   48    2    1   15    0    0    5    0    0   47    0
  62          0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    0    2    0
  70          0    0    0    0    0    1    0    0    1    0    0    1    0    6    1    0    0    1    0    0    4    0
  81          0    5   20    4    7   29    4    0   23    1    0   14    0    1   58    1    0    2    0    0   14    0
  82          0    5    8    2    1    1    1    0    0    0    0    1    0    0    0    0    0    0    0    0    1    0
  83          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  91          0    1    1    1    2    3    0    0   12    0    0    5    0    3    1    0    0   19    0    0    7    0
  92          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
  93          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
   1          0    1    0    0    1   30    4    0   19    0    0   33    0    4   18    5    0   12    0    0   83    0
   2          0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
TOTAL         0   18   31   10   13  136   21    0  140    6    0  132    4   16  183   21    0   57    1    0  211    0

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  6794

PERCENT LEVEL 2 =  4.83      PERCENT LEVEL 3 =   .04
```

```
ALL OBSERVATIONS, TEACHER 17
 PROBABILITIES TIMES 1000*

CATEGORY    10  20  31  32  33  41  42  43  51  52  53  61  62  70  81  82  83  91  92  93   1   2
  10         0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  20         0   2   0   0   0   2   1   0   4   0   0   1   0   0   2   0   0   1   0   0   3   0
  31         0   0   0   0   0   3   1   0   5   0   0   2   0   0   0   0   0   1   0   0   0   0
  32         0   1   0   2   0   1   0   0   2   0   0   1   0   0   0   0   0   2   0   0   0   0
  33         0   0   0   1   0   0   0   0   0   0   0   0   0   0   0   0   0   2   0   0   0   0
  41         0   0   0   0   0  13   1   0  11   0   0   4   0   0  42   4   0  14   0   0   7   0
  42         0   0   0   0   0   0   6   0   3   0   0   2   0   0   1  20   0   1   1   0   5   0
  43         0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  51         0   2   0   0   0  32  12   0 140   2   0  31   1   3  27   2   0  26   1   0  21   0
  52         0   0   0   0   0   0   1   0   1   5   0   0   0   0   0   0   0   0   0   0   0   0
  53         0   0   0   0   0   0   0   0   0   0   1   0   0   0   0   0   0   0   0   0   0   0
  61         0   0   0   0   0   6   3   0  23   0   0  26   1   1  11   1   0   7   0   0  12   0
  62         0   0   0   0   0   0   0   0   1   0   0   0   1   0   0   0   0   0   0   0   0   0
  70         0   0   0   0   0   1   0   0   4   0   0   2   0   2   2   0   0   1   0   0   2   0
  81         0   5   6   1   0  16   3   0  38   0   0   5   0   2  86   0   0   4   0   0  10   0
  82         0   2   4   0   0   2   7   0  10   0   0   2   0   0   0   1   0   1   0   0   0   0
  83         0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  91         0   1   4   4   3   7   0   0  35   0   0   8   0   2   1   0   0  29   0   0   2   0
  92         0   0   0   1   0   0   1   0   1   0   0   0   0   0   0   0   0   0   2   0   0   0
  93         0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
   1         0   2   0   0   0  11   2   0  21   0   0   9   0   3   6   2   0   8   0   0  27   0
   2         0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   1
TOTAL        0  17  14   9   4  95  39   0 299   8   2  92   3  15 179  30   0  98   5   0  91   1
NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  8452
PERCENT LEVEL 2 =  8.14      PERCENT LEVEL 3 =   .15
```

276

Language Arts and Reading:--In order to show some contrast in classroom interaction at the second grade, separate matrices for each teacher are shown for the teaching of reading and language arts. These matrices are formed by cumulating all observation periods during which each subject was taught. In each case the total number of tallies is shown at the bottom of each page. Each matrix is based on tallies per thousand so that comparisons can be made between one matrix and another. Certain ratios are also listed below each matrix. The 10 x 10 matrices for reading are shown on the next fifteen pages, followed by the matrices for language arts.

```
TEACHER ONE- READING
 PROBABILITIES TIMES 1000*

CATEGORY          1    2    3    4    5    6    7    8    9   10

   1              0    0    0    0    0    0    0    0    0    0

   2              0    2    0    2    3    6    0    1    0    1

   3              0    0    2    0    1    0    0    1    1    2

   4              0    0    0    7    2    2    1   24    1    3

   5              0    1    0   14   78   23    2   30    7   32

   6              0    0    0    3   12   25    2   20    6   16

   7              0    0    0    1    2    2    6    6    1    6

   8              0   11    1    6   38   11    3  289    4   35

   9              0    0    5    2   14    3    4    1    8    2

  10              0    0    0    6   35   11    5   27   10  108

TOTAL             0   15    8   41  186   84   25  398   39  203

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2495

                         SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .179        .176                   36.0             43.7
```

TEACHER TWO- READING

PROBABILITIES TIMES 1000*

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	2	0	1	0	0	0	1
3	0	1	8	5	2	5	0	8	5	4
4	0	0	1	32	6	4	1	65	12	31
5	0	0	0	21	58	8	1	30	2	14
6	0	0	0	6	5	25	0	17	1	21
7	0	0	0	2	1	0	3	1	0	0
8	0	3	21	45	28	17	0	146	3	36
9	0	0	8	8	4	1	0	0	28	5
10	0	1	1	30	27	16	2	33	2	124
TOTAL	0	4	38	153	133	76	7	301	54	234

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 1544

SUMMARY DATA

BIG I/I+D	LITTLE I/I+D	PERCENT TCH TALK	PERCENT ST TALK
.474	.335	41.1	35.4

```
TEACHER THREE- READING
 PROBABILITIES TIMES 1000*

 CATEGORY        1    2    3    4    5    6    7    8    9   10

    1            0    0    0    0    0    0    0    0    0    0

    2            0    2    0    1    8    1    0    1    0    2

    3            0    0    8    1    3    1    1    0    0    0

    4            0    1    0   30   12    3    0   25    1    2

    5            0    5    3   22  284   22    4   16    9    8

    6            0    1    0    0   11   36    1   11    0   12

    7            0    0    0    1    7    2    7    2    0    3

    8            0    3    2   16   26    2    5  269    1    4

    9            0    0    1    0   11    0    0    1    8    0

   10            0    1    0    2   12    6    3    3    2   51

 TOTAL           0   14   15   74  373   73   21  328   22   81

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2642

                     SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .180         .232                57.0             35.0
```

```
TEACHER FOUR - READING
 PROBABILITIES TIMES 1000*

CATEGORY         1    2    3    4    5    6    7    8    9   10

   1             0    0    0    0    0    0    0    0    0    0

   2             0    3    1    6    2    5    0    1    1    8

   3             0    2    5    6    4    3    0    4    3    9

   4             0    0    0   19    5    3    1   52    5   17

   5             0    2    0   14   53    7    1   30    4   18

   6             0    0    0    3    3   21    1   13    2   29

   7             0    0    0    1    2    1    8    2    1    6

   8             0   15   21   23   31    7    2  168    6   33

   9             0    2    7    6    6    3    2    2   40    6

  10             0    3    2   25   23   23    5   34   11  108

TOTAL            0   28   37  102  128   73   20  306   74  232

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  6094

                   SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .430        .412                38.8             38.0
```

```
TEACHER FIVE - F READING
 PROBABILITIES TIMES 1000*

 CATEGORY        1     2     3     4     5     6     7     8     9    10

     1           0     0     0     0     0     0     0     0     0     0

     2           0     1     0     2     1     1     0     1     1     1

     3           0     0     5    16     8     4     0     8     3     3

     4           0     0     1    28     5     3     0    70     5    21

     5           0     0     1    24    95    17     0     8     4    13

     6           0     0     0     4     9    21     1    19     5    18

     7           0     0     0     0     0     0     1     0     1     1

     8           0     4    32    40    17    14     1   253     4    28

     9           0     2     7     2     9     4     0     0    14     5

    10           0     0     0    18    18    12     1    33     7    41

TOTAL            0     9    46   134   163    76     5   393    44   131

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  4751

                      SUMMARY DATA

BIG I/I+D    LITTLE I/I+D    PERCENT TCH TALK    PERCENT ST TALK

    .436         .404                   43.2               43.7
```

```
TEACHER SIX - READING
 PROBABILITIES TIMES 1000*

CATEGORY        1    2    3    4    5    6    7    8    9   10

   1            0    0    0    0    0    0    0    0    0    0

   2            0    1    1    4    4    3    0    1    0    1

   3            0    1    5   10    3    3    0    3    2    1

   4            0    0    1   10   15   15    1   42    1   14

   5            0    1    0   34   77   24    0   36    5   12

   6            0    1    0    3   12   14    0   48    3   20

   7            0    0    0    0    0    1    1    1    0    1

   8            0   10   17   25   52   26    1  297    6   15

   9            0    0    4    2   10    1    0    1    4    0

  10            0    1    0   10   15   12    1   21    1   35

TOTAL           0   15   27   99  189  101    3  449   21   96

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  1549

              SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

  .326         .289               43.3              47.1
```

```
TEACHER  SEVEN - READING
 PROBABILITIES TIMES 1000*

CATEGORY       1    2    3    4    5    6    7    8    9   10

   1           0    0    0    0    0    0    0    0    0    0

   2           0    1    0    2    2    1    0    0    0    2

   3           0    0    7   18    6    4    2    8    4    5

   4           0    0    0   37    4    6    1   49    9   21

   5           0    0    0   15   46    9    2   29    2   10

   6           0    0    0    2    4   10    2   19    4   15

   7           0    0    0    3    3    4   14    4    0    7

   8           0    6   33   23   24    7    6  269    0   31

   9           0    1   11    4    4    1    1    0    5    1

  10           0    1    2   22   20   14    8   22    3   80

 TOTAL         0   11   55  128  113   57   36  400   28  172

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  4037

                    SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .486         .419                  40.1            42.8
```

```
TEACHER EIGHT - READING
 PROBABILITIES TIMES 1000*

CATEGORY          1     2     3     4     5     6     7     8     9    10

    1             0     0     0     0     0     0     0     0     0     0

    2             0     1     1     4     4     2     0     1     0     0

    3             0     1     7     6     2     2     0     5     2     2

    4             0     0     0    31     5     6     1    67     2    21

    5             0     0     0    21    90    23     3    20     5    24

    6             0     1     0     9    14    43     3    16     0    24

    7             0     0     0     2     2     2    12     2     0    12

    8             0     8    15    40    32    14     4   141     1    16

    9             0     1     2     1     7     2     0     0     8     2

   10             0     0     1    19    30    17     9    21     4    97

TOTAL             0    13    27   133   188   111    33   273    24   199

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2432

                      SUMMARY DATA

BIG I/I+D    LITTLE I/I+D    PERCENT TCH TALK    PERCENT ST TALK

   .343         .217                    50.5              29.6
```

```
TEACHER NINE - READING
 PROBABILITIES TIMES 1000*

CATEGORY          1     2     3     4     5     6     7     8     9    10

   1              0     0     0     0     0     0     0     0     0     0

   2              0     1     0     3     3     4     0     0     0     1

   3              0     0     8     3     4     4     0    11     1     3

   4              0     1     0    24     8     7     0    45     3    19

   5              0     0     0    23   196    23     2    27     2    18

   6              0     0     0     5    10    13     0    39     4    24

   7              0     0     0     1     1     1     3     0     0     3

   8              0    10    20    32    39    18     1   110     1    21

   9              0     1     4     2     3     2     0     0    12     1

  10              0     0     2    12    26    24     2    20     2    83

TOTAL             0    14    35   107   290    97     8   252    25   173

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  6267

                    SUMMARY DATA

BIG I/I+D   LITTLE I/I+D    PERCENT TCH TALK    PERCENT ST TALK

   .282          .316                 55.1              27.7
```

```
TEACHER TEN READING
 PROBABILITIES TIMES 1000*

 CATEGORY         1    2    3    4    5    6    7    8    9   10

     1            0    0    0    0    0    0    0    0    0    0

     2            0    1    1    4    5    7    0    1    1    2

     3            0    3    2    6    4    2    0    2    0    1

     4            0    1    0   21   16   10    2   69    3   14

     5            0    4    0   35   95   30    4   32    7   12

     6            0    1    0   10   10   17    3   55    2   18

     7            0    0    0    3    2    3    3    6    0    4

     8            0    9   16   40   60   33    6  175    2   11

     9            0    0    2    3    8    2    1    0    7    1

    10            0    1    0   14   18   11    2   12    2   29

 TOTAL            0   22   20  136  218  116   21  353   24   90

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  4435

                   SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

    .333         .235                 53.3            37.7
```

```
TEACHER ELEVEN - READING
 PROBABILITIES TIMES 1000*

 CATEGORY          1     2     3     4     5     6     7     8     9    10

     1             0     0     0     0     0     0     0     0     0     0

     2             0     3     5     7     7     9     0     3     2     2

     3             0     2     8     9     6     4     0     4     3     2

     4             0     0     0    19     5     4     0    64     7     6

     5             0     2     1    24   111    25     2    28    10    14

     6             0     1     0     8    14    28     1    40     5    17

     7             0     0     0     1     1     1     2     2     0     3

     8             0    25    16    28    44    26     2   154     9    15

     9             0     5     7     3    16     8     1     4    17     4

    10             0     1     0     8    12    11     2    20     9    31

TOTAL              0    39    38   105   217   114     9   319    65    94

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  7136

                    SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .348        .382                   52.2           38.4
```

```
TEACHER 14  REACING
 PROBABILITIES TIMES 1000*

 CATEGCRY         1     2     3     4     5     6     7     8     9    10

    1             0     0     0     0     0     0     0     0     0     0

    2             0     0     0     1     1     3     0     1     0     3

    3             0     0     4     2     4     2     0     6     9     1

    4             0     0     0    11     5     1     1    42     2     5

    5             0     2     0    16   104    23     4    74     4    18

    6             0     0     0     2    11    31     6    21     3    25

    7             0     0     0     2     6     3    15     7     1    11

    8             0     6    12    23    77    15     7   157     1    19

    9             0     0    11     0     7     0     4     1    17     4

   10             0     0     0     9    32    20     8     8     7    60

 TOTAL            0     9    28    67   246    98    45   317    44   145

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2534

                    SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

    .213         .210                 49.4               36.1
```

```
TEACHER 15  READING
 PROBABILITIES TIMES 1000*

 CATEGORY        1     2     3     4     5     6     7     8     9    10

    1            0     0     0     0     0     0     0     0     0     0

    2            0     0     0     2     2     3     0     0     0     1

    3            0     0     0     2     2     2     0     1     3     0

    4            0     0     0    16     9     9     0    47     9     3

    5            0     2     0    19    29    37     3    19    19    10

    6            0     0     0    17    20    51     4    27    17    23

    7            0     0     0     1     0     5     3     4     1     5

    8            0     3     6    19    39    28     7   305     3    11

    9            0     3     3    10    28    11     1     3    10     1

   10            0     0     0     9     8    13     2    13     8    29

 TOTAL           0     8     9    94   137   159    19   420    70    83

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  1187

                       SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK    PERCENT ST TALK

    .261         .087                  42.6             49.0
```

```
TEACHER 16  READING
 PROBABILITIES TIMES 1000*

CATEGORY       1    2    3    4    5    6    7    8    9   10

    1          0    0    0    0    0    0    0    1    0    0

    2          0    0    1    6    1    9    0    8    1    8

    3          0    4    2   21    2    5    0   15    2    8

    4          0    1    0   29    2    4    2  103    4   15

    5          0    1    0   15   36   11    0   10    4    7

    6          0    2    0    6    5   53    2   18    4   52

    7          0    0    0    1    1    2    5    1    1    4

    8          1   23   53   51   24   18    1  101    3   11

    9          0    2    3    3    6    6    2    1   22    4

   10          0    1    1   28    7   35    3   27    7   68

TOTAL          1   33   59  159   83  142   14  284   48  177

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  1840

                  SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .512         .371                 49.1             33.2
```

```
TEACHER 17  READING
 PROBABILITIES TIMES 1000*

 CATEGORY         1    2    3    4    5    6    7    8    9   10

    1             0    0    0    0    0    0    0    0    0    0

    2             0    0    0    2    3    3    0    5    1    0

    3             0    1    2    4    3    2    0    0    2    0

    4             0    0    0   18   12    5    1   59   11   13

    5             0    1    0   38   90   34    2   54   28   11

    6             0    0    0    8   24   30    2   19    9   10

    7             0    0    0    1    4    2    1    4    2    1

    8             0   11    7   33   65   11    4  157    7   19

    9             0    0    6    6   36   11    2    1   25    2

   10             0    0    0    8   20    6    2   14    5   14

 TOTAL            0   14   15  119  257  103   15  315   91   71

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  4029

                    SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .283         .197                   52.3              40.6
```

TEACHER ONE- LANGUAGE ARTS
PROBABILITIES TIMES 1000*

CATEGORY	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	0	3	0	2	4	3	0	2	2	3
3	0	0	3	0	3	2	0	1	2	2
4	0	0	0	7	4	3	1	32	2	3
5	0	1	0	14	85	27	6	28	14	33
6	0	1	0	3	13	24	3	12	8	29
7	0	0	0	1	3	2	6	3	1	10
8	0	8	3	8	37	7	2	77	5	21
9	0	3	6	5	27	3	2	0	18	12
10	0	3	0	11	31	20	6	15	26	240
TOTAL	0	18	12	50	208	92	25	168	76	351

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS 3996

SUMMARY DATA

BIG I/I+D	LITTLE I/I+D	PERCENT TCH TALK	PERCENT ST TALK
.197	.206	40.5	24.4

```
TEACHER TWO - LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

CATEGORY          1    2    3    4    5    6    7    8    9   10

   1              0    0    0    0    0    0    0    0    0    0

   2              0   24    0    2    5    9    0    2    2   22

   3              0    2   12    3    5    1    1    8    5    7

   4              0    1    0    9    2    0    2   28    2   12

   5              0    6    0    9   86   11    2    5    4   28

   6              0    3    1    3    7   64    5    2    6   37

   7              0    1    0    2    4    4   11    0    1   14

   8              0    2   16    9   14    4    2   13    0   11

   9              0    4   13    0    4    2    1    0   19    5

  10              0   24    0   20   26   34   12   12    9  265

 TOTAL            0   65   42   57  153  129   36   70   48  400

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  1274

                    SUMMARY DATA

 BIG I/I+D    LITTLE I/I+D   PERCENT TCH TALK    PERCENT ST TALK

    .340          .395                  48.2            11.8
```

```
TEACHER THREE- LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

CATEGORY          1     2     3     4     5     6     7     8     9    10

    1             0     0     0     0     0     0     0     0     0     0

    2             0     4     2     4     7     2     0     0     0     4

    3             0     1    14     5     7     1     0     2     1     0

    4             0     1     2    62    12     4     0    44     4     6

    5             0     6     1    32   270    21     1    13    12    19

    6             0     0     0     3    11    34     2     7     2    12

    7             0     0     0     1     2     2    11     0     1     3

    8             0     8     7    19    25     6     1    70     1     4

    9             0     0     4     3    18     1     0     0    24     2

   10             0     2     0     7    23     4     5     4     7    92

TOTAL             0    23    32   137   375    73    21   141    53   145

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2094

                     SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

  .290         .369                 66.1             19.4
```

```
TEACHER FOUR - LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

 CATEGORY        1    2    3    4    5    6    7    8    9   10

    1            0    0    0    0    0    0    0    0    0    0

    2            0    0    0    4    4    0    0    0    1    5

    3            0    1    4   12    4    4    0    2    2    8

    4            0    0    1   32    3    2    2   59    9   32

    5            0    0    0   21   99   11    2    8    2   24

    6            0    1    0    2    9   37    1    7    0   45

    7            0    0    0    3    2    1   12    0    2   13

    8            0    5   23   24   20    4    0   11    1   14

    9            0    2    8    0    9    3    2    0   24    8

   10            0    5    0   42   17   39   14   16   15  207

 TOTAL           0   14   36  140  167  101   32  102   55  353

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  1030

                    SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

    .387         .271                 48.9            15.7
```

```
TEACHER FIVE - LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

CATEGORY          1     2     3     4     5     6     7     8     9    10

   1              0     0     0     0     0     0     0     0     0     0

   2              0     2     2     2     2     1     0     0     0     2

   3              0     0     3     5     7     2     0     4     2     6

   4              0     0     0    21     6     4     1    48    10    19

   5              0     0     0    26   110    30     2     1     7    32

   6              0     1     0     6    16    44     2     6     6    66

   7              0     0     0     1     3     1     3     0     1     1

   8              0     4    16    15    13     9     0    16     1     8

   9              0     3     5     7    12     6     1     1    36     8

  10              0     1     4    25    40    50     2     7    13   187

TOTAL             0    10    29   108   209   147     9    82    77   329

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  1931

                     SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

  .287        .199                  51.2            15.9
```

```
TEACHER SIX - LANGUAGE ARTSA
 PROBABILITIES TIMES 1000*

 CATEGORY          1    2    3    4    5    6    7    8    9   10

     1             0    0    0    0    0    0    0    0    0    0

     2             0    3    1    2    6    5    0    1    2    2

     3             0    2    6    7    9    4    0    3    1    5

     4             0    1    1    9    4    8    1   49    2    7

     5             0    2    1   24  130   43    1   14   14   32

     6             0    1    0    7   19   35    1   42    9   36

     7             0    0    0    1    1    1    0    1    0    2

     8             0   10   22   16   36   21    1   77    3    8

     9             0    1    5    3   22    6    1    0   11    4

    10             0    2    0   12   33   28    1    8   11  103

TOTAL              0   21   36   8C  261  151    6  194   54  197

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  3521

                    SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

  .247         .268                  55.6            24.7
```

```
TEACHER SEVEN - SANGUAGE ARTS
 PROBABILITIES TIMES 1000*

 CATEGORY           1    2    3    4    5    6    7    8    9   10

     1              0    0    0    0    0    0    0    0    0    0

     2              0    1    1    1    2    1    1    0    0    1

     3              0    1    7   11   11    2    0    2    2    4

     4              0    1    0   21    7    9    0   44    6    9

     5              0    0    0   28  194   27    6    1    4   61

     6              0    0    0    4   11   38    2   19    0   35

     7              0    1    0    1    6    1   16    0    0   18

     8              0    3   26   18   14    2    1    5    0    6

     9              0    0    5    6    4    1    0    0    0    0

    10              0    0    0    9   71   29   17    4    2  162

 TOTAL              0    6   39   98  320  109   43   74   15  295

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  1237

                    SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .233         .230                  61.5             9.0
```

```
TEACHER EIGHT - LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

CATEGORY          1    2    3    4    5    6    7    8    9   10

   1              0    0    0    0    0    0    0    0    0    0

   2              0    1    1    2    1    3    0    0    0    1

   3              0    0   14   17    8    5    1    7    3    3

   4              0    0    0   20    3    3    2  104    6   24

   5              0    0    0   33   50   19    3   15    5   10

   6              0    0    0   10   13   37    2   18    6   20

   7              0    0    0    3    3    2   17    2    2    8

   8              0    3   37   60   34   19    5   72    2   11

   9              0    4    4    5    9    4    3    1   37    1

  10              0    1    1   13   14   15    4   26    6   62

 TOTAL            0   10   58  162  175  105   37  244   67  141

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  4195

                        SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .420          .324                  54.8             31.1
```

```
TEACHER NINE - LANGUAGER ARTS
 PROBABILITIES TIMES 1000*

CATEGORY       1    2    3    4    5    6    7    8    9   10

   1           0    0    0    0    0    0    0    0    0    0

   2           0    2    0    2    5   12    0    0    0    0

   3           0    2    7    0    4    0    0   11    0    4

   4           0    0    0   21    7    2    0   35    0   18

   5           0    0    2   25  265   32    4   18    2   19

   6           0    0    0    4   14   37    0   57    0   27

   7           0    0    0    0    0    5    2    0    0    2

   8           0   18   16   25   42   35    2   85    4   14

   9           0    0    2    0    4    0    0    2    0    2

  10           0    0    0    7   23   12    2   34    4   27

TOTAL          0   21   27   83  366  138    9  240    9  108

NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS   566

                     SUMMARY DATA

BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

  .203          .245                64.3             24.9
```

```
TEACHER TEN - LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

 CATEGORY          1    2    3    4    5    6    7    8    9   10

     1             0    0    0    C    0    0    0    0    0    0

     2             0    C    0    4    5    5    0    0    2    0

     3             0    1    3    6   10   12    0    0    4    4

     4             0    2    1   16   22   17    1   66    5   14

     5             0    3    1   45   68   41    3   11    7   24

     6             0    1    1    8   20   39    3   50    9   32

     7             0    0    0    4    1    1    2    0    0    3

     8             0    5   27   36   39   17    1   21    3    8

     9             0    0    8    7   13    4    0    0   76    7

    10             0    3    0   18   24   26    3    7    8   49

 TOTAL             0   17   43  146  204  163   13  157  117  140

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2020

                     SUMMARY DATA

 BIG I/I+D    LITTLE I/I+D    PERCENT TCH TALK    PERCENT ST TALK

   .351          .253                  58.6              27.4
```

```
TEACHER ELEVEN - LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

 CATEGORY        1    2    3    4    5    6    7    8    9   10

    1            0    0    0    0    0    0    0    0    0    0

    2            0   15    8    6   11   10    0    3    3    3

    3            0    2   13    7    5    6    0    5    6    3

    4            0    0    0   17    4    4    0   32   19    7

    5            0    6    2   24  171   30    0    9   17   23

    6            0    4    0    7   19   40    1   29   12   21

    7            0    0    0    0    1    0    0    1    0    1

    8            0   18    8   10   22   20    1   80    4    8

    9            0   12   14    3   24    6    1    5   24    5

   10            0    3    1    7   24   17    1    8   10   57

 TOTAL           0   60   46   82  281  134    4  171   94  127

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2717

                     SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

   .310         .436                  60.8           26.5
```

```
TEACHER 14  LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

 CATEGORY          1     2     3     4     5     6     7     8     9    10

    1              0     0     0     0     0     0     0     0     0     0

    2              0    18     2     3    13     8     3     0     2    10

    3              0     0     0     2     5     3     3     0     2     5

    4              0     2     0     3     5     0     0     6     6     3

    5              0    14     0     6   207    43    10     0    19    57

    6              0     6     2     3    22    51    11     0    11    38

    7              0     2     0     0    13     8    35     3     3    30

    8              0     0     3     0     3     0     2     0     0     2

    9              0     3    13     0    27     3     2     0     2     3

   10              0    13     0     8    62    29    29     0     8    92

 TOTAL             0    57    19    25   357   145    94    10    53   240

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS    628

                      SUMMARY DATA

 BIG I/I+D    LITTLE I/I+D    PERCENT TCH TALK    PERCENT ST TALK

    .146          .242                    69.7              6.2
```

```
TEACHER 15  LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

 CATEGORY         1    2    3    4    5    6    7    8    9   10

     1            0    0    0    0    0    0    0    0    0    0

     2            0    0    0    0    4    2    0    1    2    2

     3            0    2    0    3    6    2    0    0    2    2

     4            0    0    0   15    8   10    2   58    6   14

     5            0    2    0   34  123   50    3   20   17   48

     6            0    1    0   13   37   61    3   28   10   25

     7            0    0    0    1    4    2    2    2    0    2

     8            0    4   13   30   51   16    1   30    2    8

     9            0    1    3    4   27   12    0    0    5    3

    10            0    0    0   13   38   21    2   17   11   55

 TOTAL            0   11   16  114  298  178   13  155   57  157

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2402

                        SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

    .224         .125                    63.1            21.2
```

```
TEACHER 16  LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

 CATEGORY           1    2    3    4    5    6    7    8    9   10

     1              0    0    0    0    0    0    0    0    0    0

     2              0    1    0    3    4    2    0    1    1    4

     3              0    1    5    8    9    5    0   12    2    7

     4              0    1    0   26    5    2    0   77    8   13

     5              0    1    1   31   87   23    1    9    6   22

     6              0    3    1   10    9   75    1   24    4   52

     7              0    0    1    1    2    1   12    0    3    7

     8              0    9   35   27   31   17    0   24    3   18

     9              0    0    6    2   12    5    4    0   16    9

    10              0    1    0   23   24   48    9   17   10   68

 TOTAL              0   15   49  132  182  178   27  165   53  200

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  1391

                        SUMMARY DATA

 BIG I/I+D   LITTLE I/I+D   PERCENT TCH TALK   PERCENT ST TALK

     .336         .238                 58.2              21.8
```

```
TEACHER 17  LANGUAGE ARTS
 PROBABILITIES TIMES 1000*

 CATEGORY         1     2     3     4     5     6     7     8     9    10

    1             0     0     0     0     0     0     0     0     0     0

    2             0     3     1     5     6     0     0     0     3     5

    3             0     2     4    12     8     3     0     0     3     1

    4             0     1     0    14    12     5     0    89    15    11

    5             0     6     0    43   205    36     3     6    29    34

    6             0     1     0    11    29    32     1     7     7    11

    7             0     0     0     0     4     1     1     0     1     1

    8             0     4    17    37    36     8     0    22     2     1

    9             0     1    12     8    39     5     2     0    13     2

   10             0     3     0    16    23     9     2     4     8    38

 TOTAL            0    23    35   149   362   100    11   129    84   106

 NUMBER OF TALLIES ON WHICH MATRIX IS BASED IS  2013

                       SUMMARY DATA

 BIG I/I+D    LITTLE I/I+D    PERCENT TCH TALK    PERCENT ST TALK    BIG V.C.

   .305          .346                   68.1             21.3          1.093
```

Second Grade Summary Matrices:--The next two pages show summary matrices for the entire fifteen teachers in the second grade sample. All observations are included. The first summary matrix is for the 10 x 10 category form. The second matrix shows the 22 x 22 category form. All cell frequencies are shown as percents, not as millages.

```
ALL TEACHERS ALL OBSERVATIONS

 MEAN PERCENTAGES (NOTE -PERCENTAGES - NOT PROBABILITIESX1000) IN EACH CELLOF
THE MATRIX FOR THE PREVIOUS GROUP OF TEACHERS

 CATEGORY         1    2    3    4    5    6    7    8    9   10

    1            .0   .0   .0   .0   .0   .0   .0   .0   .0   .0

    2            .0   .2   .1   .3   .4   .3   .0   .1   .1   .3

    3            .0   .1   .7   .7   .6   .3   .0   .5   .3   .4

    4            .0   .1   .0  2.3   .7   .5   .1  5.3   .6  1.5

    5            .0   .2   .1  2.5 13.3  2.3   .3  1.7   .9  2.1

    6            .0   .1   .0   .6  1.3  3.2   .2  1.9   .5  2.6

    7            .0   .0   .0   .2   .3   .2   .8   .2   .1   .7

    8            .0   .7  1.8  2.5  3.1  1.2   .2 10.2   .3  1.4

    9            .0   .2   .8   .4  1.4   .4   .1   .1  2.6   .5

   10            .0   .2   .1  1.7  2.4  2.0   .6  1.5  1.0  9.6


 STANDARD DEVIATIONS OF THE PERCENTAGES OF EACH CELL IN THE PREVIOUS MATRIX

 CATEGORY         1    2    3    4    5    6    7    8    9   10

    1            .0   .0   .0   .0   .0   .0   .0   .0   .0   .0

    2            .0   .2   .1   .2   .2   .2   .0   .1   .1   .2

    3            .0   .1   .3   .5   .2   .1   .0   .3   .2   .2

    4            .0   .1   .0  1.2   .4   .3   .1  1.6   .4   .7

    5            .0   .2   .1   .8  6.5  1.0   .3   .7   .7   .5

    6            .0   .0   .0   .4   .7  1.2   .1  1.2   .3  1.0

    7            .0   .0   .0   .1   .3   .1   .8   .1   .1   .5

    8            .0   .5  1.0  1.0  1.0   .6   .1  3.0   .2   .5

    9            .0   .2   .3   .2   .9   .3   .1   .1  1.2   .3

   10            .0   .1   .1   .8   .5   .7   .4   .6   .5  4.9
```

ALL TEACHERS,ALL OBSERVATIONS, SECOND GRADE

MEAN PERCENTAGES (NOTE -PERCENTAGES - NOT PROBABILITIESX1000) IN EACH CELLOF
THE MATRIX FOR THE PREVIOUS GROUP OF TEACHERS

CATEGORY	10	20	31	32	33	41	42	43	51	52	53	61	62	70	81	82	83	91	92	93	1	2
10	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
20	.0	.2	.0	.0	.0	.2	.1	.0	.4	.0	.0	.3	.0	.0	.1	.0	.0	.1	.0	.0	.3	.0
31	.0	.1	.0	.1	.1	.4	.1	.0	.3	.0	.0	.2	.0	.0	.0	.0	.0	.1	.0	.0	.2	.0
32	.0	.0	.0	.2	.1	.2	.0	.0	.2	.0	.0	.1	.0	.0	.0	.0	.0	.1	.0	.0	.1	.0
33	.0	.0	.0	.0	.1	.1	.0	.0	.1	.0	.0	.0	.0	.0	.3	.1	.0	.2	.0	.0	.1	.0
41	.0	.1	.0	.0	.0	1.8	.1	.0	.6	.0	.0	.5	.0	.1	4.3	.1	.0	.6	.0	.0	1.2	.0
42	.0	.0	.0	.0	.0	.0	.4	.0	.1	.0	.0	.1	.0	.0	.1	.9	.0	.0	.0	.0	.3	.0
43	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
51	.0	.2	.0	.0	.0	2.0	.4	.0	12.6	.1	.0	2.2	.0	.3	1.6	.1	.0	.9	.0	.0	2.0	.1
52	.0	.0	.0	.0	.0	.0	.1	.0	.1	.5	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
53	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
61	.0	.1	.0	.0	.0	.6	.1	.0	1.3	.0	.0	3.0	.1	.2	1.7	.2	.0	.5	.0	.0	2.5	.1
62	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0
70	.0	.0	.0	.0	.0	.1	.0	.0	.3	.0	.0	.2	.0	.8	.2	.0	.0	.1	.0	.0	.6	.0
81	.0	.5	.9	.3	.3	1.9	.2	.0	2.7	.0	.0	1.1	.0	.2	9.9	.0	.0	.3	.0	.0	1.3	.0
82	.0	.2	.2	.1	.1	.1	.2	.0	.2	.1	.0	.1	.0	.0	.0	.2	.0	.0	.0	.0	.1	.0
83	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
91	.0	.2	.1	.3	.3	.4	.0	.0	1.3	.0	.0	.4	.0	.1	.1	.0	.0	2.4	.0	.0	.5	.0
92	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.0
93	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
1	.0	.2	.0	.0	.0	1.4	.2	.0	2.3	.0	.0	2.0	.0	.5	1.3	.2	.0	.9	.0	.0	8.9	.1
2	.0	.0	.0	.0	.0	.0	.0	.0	.1	.0	.0	.1	.0	.1	.0	.0	.0	.0	.0	.0	.0	.6

Part II

THE FOURTH GRADE

There were 16 teachers who taught a two-week unit on New Zealand to their fourth grade classes. The code numbers, age, and years of experience are, respectively: 11-25-4; 13-23-1; 15-30-8; 18-29-6; 19-25-4; 22-23-2; 24-51-13; 25-24-3; 26-24-3; 32-37-2; 36-22-1; 40-62-21; 48-22-1; 58-26-5; 68-64-25; and 70-27-3. The classes all came from the same school system and no attempt was made to assign classes to different socio-economic levels.

The teachers who taught New Zealand units were selected from all of the fourth grade teachers who were employed in the district. The procedure of selection, described in Volume I, was designed to make the sample of 16 representative of all fourth grade teacher-classroom units in terms of pupil attitudes toward the teacher and the class.

Information About Class Achievement and Attitude.

The results from the first, second, and third administration of the New Zealand achievement test are shown in Table II-1. The mean percentage gain scores between pretest and second post-test are shown in Table II-2. When achievement is adjusted through covariance regression, the results are shown in Table II-3. The second administration of the pupil attitude inventory is also shown in Table II-3, separately for teacher attractiveness and the pupil anxiety subscale.

TABLE II-1

MEAN SCORES AND STANDARD DEVIATIONS FROM THE FIRST, SECOND, AND THIRD ADMINISTRATION OF NEW ZEALAND ACHIEVEMENT TEST

Teacher Number	First Administration		Second Administration		Third Administration	
	Mn	σ	Mn	σ	Mn	σ
11	10.63	4.97	24.55	7.21	22.03	7.01
13	12.71	7.42	20.95	12.44	22.39	10.79
15	15.52	7.41	26.27	7.10	27.13	7.42
18	9.26	7.44	22.12	10.21	19.76	10.62
19	11.51	5.60	23.25	7.65	20.70	8.11
22	11.46	6.05	20.62	7.43	20.70	6.82
24	9.15	5.20	15.10	6.72	15.43	7.65
25	11.58	7.03	23.33	8.23	24.12	9.24
26	9.83	5.64	20.33	8.70	17.71	10.15
32	16.10	7.60	25.64	11.66	24.50	11.06
36	10.43	5.96	25.71	7.94	23.52	8.96
40	11.16	6.67	20.33	9.84	17.65	9.08
48	8.23	4.41	18.76	6.90	14.84	7.56
58	14.57	7.56	18.10	10.90	16.47	9.20
68	9.00	4.18	19.40	5.76	17.80	7.79
70	4.96	6.09	11.20	7.55	9.01	7.20

TABLE II-2

MEAN PERCENTAGE GAIN SCORES BETWEEN THE PRETEST AND SECOND POST-TEST

Teacher Number	Mn Percentage Gain Score	Teacher Number	Mn Percentage Gain Score
11	28.7	26	19.6
13	27.3	32	28.0
15	31.9	36	36.2
18	28.1	40	18.0
19	26.0	48	15.7
22	24.3	58	4.1
24	14.5	68	20.3
25	33.0	70	11.2

TABLE II-3

POST-RECALL ACHIEVEMENT SCORES ADJUSTED BY COVARYING ON PRETEST; PAI TEACHER ATTRACTIVENESS SCORES AND ANXIETY; AND CORRELATION BETWEEN ADJUSTED ACHIEVEMENT AND TEACHER ATTRACTIVENESS FOR EACH CLASS

Teacher Number	Adjusted Achievement		PAI 2nd Administration					Correlation Between Adjusted Achievement and Teacher Attractiveness	
			T.A.		Anxiety				
	Mn	S.D.	Mn	S.D.	Mn	S.D.	n_1*	r	n_2**
36	24.95	7.14	105.3	19.7	19.6	3.8	23	0.5164	20
25	23.65	7.84	106.0	16.5	17.7	4.0	24	0.1917	24
11	22.97	6.82	111.0	13.8	20.2	6.0	25	-0.025	25
15	22.97	7.23	104.5	15.3	19.5	5.1	20	0.318	20
18	21.97	8.18	89.0	18.4	15.5	4.4	28	0.0375	27
22	21.40	7.42	97.0	19.8	16.6	5.2	28	0.2831	28
13	21.15	6.90	98.6	19.4	20.6	3.4	18	0.2359	16
19	21.00	5.97	105.9	12.1	18.5	4.7	32	0.0109	31
32	20.85	8.69	94.9	22.5	20.4	5.1	31	-0.0118	30
68	18.82	9.38	99.6	16.2	20.3	4.4	21	0.2311	19
26	18.60	8.46	106.3	19.2	19.8	3.4	23	0.1999	23
40	18.53	6.86	68.3	13.0	18.2	4.7	28	0.418	25
48	17.27	6.21	103.2	18.6	18.3	6.1	25	-0.0155	23
24	16.70	8.67	84.8	31.0	19.0	5.2	22	0.3328	22
70	13.72	6.67	90.2	17.0	15.3	4.4	21	-0.0253	21
58	13.42	7.69	80.8	20.5	17.9	4.3	28	0.1219	28

*n_1 includes all students with pretest and post-recall test scores.

**n_2 includes all of n_1 except those who were absent during the second administration of PAI which followed the New Zealand unit.

The Category System.

Two systems are required for this kind of interaction analysis. First, there is the category system which is used for encoding statements. Second, there is a time-use category system which is used to keep track of different activities in terms of purpose, formation, and other characteristics.

The Verbal Category System:--A twenty-two category system was developed for use in the fourth grade project. The system was developed by subscripting the basic ten categories of Flanders, just as was done in the second grade project. The list of categories is shown in Table II-4.

TABLE II-4

SUMMARY OF CATEGORIES FOR INTERACTION ANALYSIS, 1965-1966

TEACHER TALK	1:0*	*ACCEPTS FEELING:*--accepts and clarifies the tone of feeling of the students in an unthreatening manner. Feelings may be positive or negative. Predicting or recalling feelings are included.
	2:1*	*SUPERFICIAL PRAISE:*--short comments of praise or approval of student behavior. Comments like "um hm," "go on," "right," and "good."
	2:2*	*EXTENDED PRAISE OR ENCOURAGEMENT:*--encourages or praises student action or behavior. Jokes that release tension, but not at the expense of another individual. Most genuine, student really hears it.
	3:1*	*SUPERFICIAL RECOGNITION OF STUDENT'S IDEAS:*--merely repetition of student's ideas.
	3:2*	*ACCEPTS OR USES IDEAS OF STUDENT:*--clarifying, or developing student's ideas. As teacher brings more of his own ideas into play, shift to category 5:2.
	3:3*	*EXTENDED USE OF STUDENT IDEAS:*--developing or comparing student's ideas in terms of other students' ideas.
	3:4*	*USES STUDENT IDEAS WITH QUESTIONS:*--turns student's ideas into a question directed towards student or students.
	4:1*	*ASKS NARROW QUESTIONS:*--asks narrow factual questions like "What?" "Where?" "When?" and other questions emphasizing recall.
	4:2*	*ASKS BROAD QUESTIONS:*--asks broad, general open questions which clearly permit choice of response. Asks opinion.
	5:1*	*FACTUAL LECTURE:*--lecture which is narrow and has factual focus. Content of talk is restricted in respect to concepts and purpose, low level reasoning.
	5:2*	*REGULAR LECTURE:*--giving of opinion about content or procedure, expressing his own ideas, asking rhetorical questions. Not 5:1.
	5:3*	*NEGATIVE LECTURE:*--negative and critical expression of opinion which disagrees with student, but not 7:0. Disagrees without explanation.
	6:1*	*NARROW DIRECTIONS:*--narrow, short commands to which compliance can be easily judged.
	6:2*	*EXPLAINED DIRECTIONS:*--explains his directions as to how something is to be done.

TABLE II-4 (continued)

TEACHER TALK	6:3*	*DIRECTIONS WITH ALTERNATIVES:*--directions include alternatives, reasons, invites students to help decide what must be done next.
	7:0*	*CRITICIZING OR JUSTIFYING AUTHORITY:*--statements intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating the *why* of the teacher's action; extreme self-reference.
STUDENT TALK	8:1*	*STUDENT TALK--RESPONSE:*--a student makes a predictable response to teacher. Teacher initiates the contact or solicits student statement and sets limits to what the student says.
	8:2*	*STUDENT QUESTION--RESPONSE:*--same as 8:1, except it is in the form of a question.
	9:1*	*STUDENT TALK--INITIATION:*--talk by students which they initiate. Unpredictable statements in response to teacher. Shift from 8:1 to 9:1 or 9:2 as student introduces own ideas.
	9:2*	*STUDENT QUESTION--RESPONSE:*--same as 9:1, except it is in the form of a question.
	10:1*	*NON-CONSTRUCTIVE SILENCE OR CONFUSION:*--non-constructive periods of silence or periods of confusion in which communication cannot be understood by the observer.
	10:2*	*CONSTRUCTIVE SILENCE OR CONFUSION:*--same as 10:1, except constructive.

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*There is NO scale implied by these numbers. Each number is classificatory, it designates a particular kind of communication event. To write these numbers down during observation is to enumerate, not to judge a position on a scale.

The Time-Use Category System:--A separate record was kept of the class activities whenever the verbal communication was being coded. By keeping a record of how time is used, it is possible to group the verbal interaction data for special analyses. For example, suppose one wished to analyze administrative routines in a class. All verbal interaction could be identified, tabulated into one display, and then analyzed, providing the records necessary to do this were at hand. Our observers kept a record of time-use by using the classification scheme shown in Table II-5.

TABLE II-5

CODE SHEET FOR TIME USE CATEGORIES

Purpose and Activity

Code Purpose

1...Long range planning
2...Short term planning, new work
3...Short term planning, done before
4...Drill and review
5...Evaluation--text or quiz--of product of work
6...Administrative routine
7...None of the above--catch-all
8...Not New Zealand

Code Activity

1...Teacher in charge of class or part of class, including lecture and drill
2...Similar to 1, except an audio-visual device in use
3...Teacher in charge, pupil or teacher reads frequently from book for class reaction
4...Teacher in charge, works with individuals or groups--seat-work, supervised study
5...Teacher in charge, unusual activity--games, dramas, songs, hukas
6...Pupil(s) in charge, teacher observes, any activity
7...None of above, miscellaneous

Formation and Freedom

Code Formation

1...Total class
2...Groups
3...Individuals

Code Freedom

1...Restrictive
2...Can't tell
3...Open

Task Set and Control

Code Task Set

1...Teacher set
2...Pupil set
3...Shared

Code Control

1...Teacher control
2...Pupil control
3...Shared control

The Fourth Grade Interaction Analysis Data.

The fourth grade interaction analysis data are presented on the pages which follow in matrix display format. There are sixteen teachers who taught the New Zealand unit of study for ten teaching days and whose classes were observed during this portion of the school day.

The 22 x 22 Master Matrices for Each Teacher:--On the next sixteen pages the master frequency matrix for each teacher can be found.

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 11 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 ULFID 66A 11

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	1	0	0	0	0	0	2	0	1	0	0	1	1	0	0	1	0	0	0	0	1	8
21	0	6	16	18	39	3	9	26	10	32	3	1	24	4	0	0	30	0	30	1	0	51	303
22	0	3	23	6	19	2	9	13	7	23	5	1	17	0	0	1	12	0	21	1	0	29	192
31	0	19	13	30	44	3	26	36	10	41	9	1	18	2	0	1	30	0	30	1	0	42	356
32	1	2	6	1	148	12	18	22	9	58	15	0	29	5	0	1	27	0	57	5	0	41	457
33	0	0	1	0	2	31	3	7	1	9	3	0	5	0	0	1	4	1	9	0	0	9	86
34	1	3	1	1	6	3	46	6	2	14	0	1	6	2	0	2	179	1	111	4	0	30	419
41	0	2	6	5	2	1	5	97	10	37	2	0	26	1	0	2	584	2	41	2	0	98	923
42	0	0	0	0	1	0	0	10	57	8	2	0	7	3	0	0	52	0	125	0	0	34	299
51	0	7	9	1	5	0	6	185	38	1175	183	4	93	22	5	7	94	19	93	16	0	155	2117
52	0	0	1	0	0	3	0	26	20	97	380	2	26	2	1	2	18	3	52	14	0	31	678
53	0	1	2	0	3	1	5	6	2	15	0	5	5	2	0	0	23	1	11	1	0	14	97
61	0	5	1	2	2	1	2	44	6	54	11	3	123	75	5	4	121	2	38	7	0	176	682
62	C	1	0	1	0	C	0	13	4	28	5	2	21	60	4	1	10	3	15	2	0	41	211
63	0	0	0	0	0	0	1	1	0	4	0	0	3	1	15	0	1	1	1	0	0	7	35
70	0	0	1	0	0	0	1	7	0	9	3	0	6	1	0	9	5	1	5	0	0	7	55
81	2	136	50	160	70	12	137	204	51	156	17	34	72	12	1	5	1241	6	98	6	0	198	2668
82	0	0	0	1	4	0	4	0	0	36	0	2	4	0	1	0	1	8	0	0	0	5	66
91	1	91	57	114	85	11	116	40	31	64	21	28	38	8	0	7	47	3	987	13	0	137	1899
92	0	0	0	9	10	0	11	3	0	16	2	1	1	0	0	0	4	0	16	37	0	15	125
1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7	0	8
2	3	26	5	7	17	3	20	164	39	229	20	12	160	14	2	11	183	15	163	15	1	1393	2502
TOTAL	8	303	192	356	457	86	419	913	297	2106	681	97	685	215	34	54	2667	66	1903	125	8	2514	14186

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 'B - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 13

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2
21	0	4	10	40	28	5	10	19	1	22	5	0	11	0	1	3	15	0	16	1	0	31	222
22	0	0	22	19	28	5	10	6	0	13	2	0	5	1	0	1	3	1	15	1	0	20	152
31	0	11	11	49	63	5	26	13	8	26	5	1	13	1	0	2	13	0	32	6	0	68	353
32	0	1	6	3	176	28	15	12	3	58	22	0	13	0	0	4	11	3	30	5	2	45	437
33	0	0	3	0	1	57	4	4	2	21	10	0	9	0	0	0	2	1	6	0	1	11	132
34	0	4	1	4	2	1	29	5	4	15	2	3	6	0	0	3	82	0	51	0	0	25	237
41	0	2	3	6	1	0	2	51	13	12	2	1	5	2	0	5	218	3	21	0	0	84	431
42	0	0	1	0	0	0	1	5	56	10	8	0	6	1	0	1	27	0	31	2	1	37	187
51	1	1	7	1	6	8	10	87	30	1719	210	0	100	17	2	15	22	11	64	15	1	145	2472
52	0	2	1	0	2	1	4	22	15	36	581	0	22	12	0	0	2	3	36	8	1	65	913
53	0	0	1	1	1	0	5	8	0	9	1	1	5	0	0	1	14	0	4	1	0	8	60
61	0	3	3	2	3	1	3	22	6	68	13	1	158	54	4	21	57	1	23	5	0	127	575
62	0	0	3	0	0	0	0	3	1	22	14	0	12	76	4	1	4	1	5	1	0	33	180
63	0	0	0	0	0	0	0	2	0	3	1	0	2	0	19	1	0	0	0	0	0	4	32
70	0	0	0	0	1	0	4	8	2	11	2	1	19	1	0	44	6	1	4	0	2	58	164
81	0	114	31	85	23	5	47	45	11	31	4	37	33	3	0	5	551	1	15	1	0	78	1120
82	0	0	2	0	6	0	2	0	0	20	2	0	2	0	0	0	1	3	0	1	0	1	40
91	0	67	44	99	58	3	50	10	6	26	3	9	23	1	0	9	8	0	639	6	0	40	1101
92	0	2	1	27	25	1	2	0	0	12	7	0	2	0	0	1	8	0	2	20	0	2	112
1	0	0	0	0	0	0	0	0	1	2	0	0	1	0	0	3	0	0	2	0	37	2	48
2	1	12	4	18	14	10	13	102	28	220	20	7	126	14	2	42	79	10	101	39	5	1418	2285
TOTAL	2	223	154	354	438	130	237	424	187	2457	914	61	573	183	32	162	1123	39	1097	112	50	2303	11255

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 15 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 15

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	2	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	5
21	0	2	1	8	7	0	2	14	7	12	5	0	1	0	0	0	12	0	12	4	1	1	89
22	0	0	8	3	2	0	1	4	1	4	1	0	1	0	0	0	0	0	4	0	0	6	35
31	0	2	1	16	16	0	6	36	18	43	7	1	2	0	1	0	32	1	23	4	1	24	234
32	0	1	1	0	66	2	8	7	14	26	10	0	1	0	0	0	2	1	15	5	1	1	161
33	0	0	0	0	0	16	0	1	0	3	1	0	0	0	0	0	0	0	0	0	0	0	21
34	0	2	0	3	4	0	35	7	6	6	0	0	0	1	1	0	16	0	62	0	0	15	158
41	0	0	1	3	2	0	0	155	2	25	0	2	6	1	0	0	289	0	10	3	0	79	578
42	0	0	0	2	0	0	1	2	65	6	1	0	4	1	0	1	50	6	97	11	0	51	298
51	1	1	9	1	10	2	2	104	41	1419	44	9	43	26	10	1	17	6	52	12	5	105	1920
52	1	0	0	0	1	0	0	19	8	36	203	0	1	4	0	0	2	0	9	1	2	7	294
53	0	0	0	0	0	0	1	6	2	8	1	7	1	3	0	0	10	2	4	2	0	9	56
61	0	0	0	0	1	0	1	14	3	26	0	2	73	12	1	0	8	5	6	1	0	67	220
62	0	0	0	0	1	0	0	3	1	22	1	2	10	108	10	0	2	4	1	0	0	17	182
63	0	0	0	0	0	0	0	2	2	9	2	0	1	4	61	0	0	5	0	0	0	3	89
70	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	10	0	0	1	0	1	5	18
81	0	43	2	141	13	0	8	81	30	69	5	17	15	1	0	1	483	0	24	1	2	55	991
82	0	0	0	0	0	0	0	1	1	16	0	0	11	6	4	0	2	6	2	0	0	0	49
91	0	36	8	44	27	0	81	22	46	35	5	9	11	2	0	0	3	0	764	8	0	62	1163
92	0	2	1	7	7	0	3	4	5	10	0	1	1	0	0	0	3	1	12	82	0	6	145
1	0	0	0	0	0	0	0	0	0	6	3	0	0	0	0	1	2	0	0	0	39	1	52
2	1	0	4	6	4	1	9	93	42	130	4	7	38	10	1	4	60	12	64	11	0	455	956
TOTAL	5	89	36	234	161	21	158	575	294	1913	294	57	221	179	89	18	993	49	1162	145	52	969	7714

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 18 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 18

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
21	0	1	0	1	0	0	0	0	0	6	0	0	0	0	0	0	0	0	1	1	0	3	13
22	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	5
31	0	5	0	8	3	2	4	17	3	36	3	2	4	0	0	3	7	0	11	1	0	21	130
32	0	0	0	1	33	3	2	6	0	20	2	2	0	0	0	0	3	0	6	2	0	17	97
33	0	0	0	0.	6	15	2	1	2	2	0	0	0	0	0	0	0	0	2	2	0	3	35
34	0	0	0	0	2	3	14	2	2	5	0	0	1	0	0	1	19	0	27	0	0	30	106
41	0	0	0	0	1	0	0	131	2	28	2	1	8	0	0	3	192	1	28	5	2	162	566
42	0	0	0	0	0	1	0	10	42	2	1	0	1	0	0	0	21	0	32	5	1	36	152
51	1	0	0	1	5	3	0	89	17	3066	50	5	28	1	0	11	18	1	112	41	5	341	3795
52	0	0	0	0	0	0	0	5	8	20	145	0	1	0	0	0	0	0	4	1	0	31	215
53	0	0	0	2	0	0	1	2	1	10	0	10	1	0	0	0	7	0	9	0	0	17	60
61	0	0	0	0	0	0	0	3	0	18	0	0	57	4	0	3	20	1	22	3	0	60	191
62	0	0	0	0	0	0	0	1	0	0	0	0	0	22	1	0	0	0	1	3	1	6	35
63	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
70	0	0	0	0	1	0	0	4	0	2	0	0	2	1	0	33	6	0	2	1	11	24	87
81	0	1	1	65	16	0	27	87	13	42	0	17	9	0	0	6	859	0	30	8	2	107	1290
82	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	1	5
91	0	4	2	30	22	6	31	33	24	83	7	11	20	0	0	4	6	0	557	9	4	141	994
92	0	1	0	5	3	1	18	1	0	49	1	6	1	0	0	3	2	0	8	32	0	13	144
1	0	0	0	0	0	0	0	7	0	10	0	0	0	1	0	5	3	0	1	3	67	1	98
2	0	1	1	16	4	1	7	163	36	389	4	6	61	5	0	14	122	2	137	27	5	1394	2395
TOTAL	1	13	5	130	97	35	106	562	150	3789	215	60	194	35	2	86	1286	5	993	144	98	2410	10416

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 19 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 19

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	10	0	1	0	0	0	0	2	0	4	0	0	0	0	0	0	2	0	0	0	0	0	19
21	0	2	1	3	5	1	1	21	0	24	0	1	2	0	0	2	8	0	11	0	0	12	94
22	0	0	27	0	2	0	3	5	0	9	0	0	1	0	0	0	4	0	3	0	0	7	61
31	0	32	4	32	33	6	35	172	13	140	2	6	5	0	0	4	45	0	49	6	2	31	617
32	0	5	3	4	72	1	3	25	0	36	0	0	1	0	0	2	8	0	25	0	0	8	193
33	0	2	0	0	5	13	1	4	0	4	0	0	0	0	0	0	0	0	6	0	0	1	36
34	0	1	0	3	2	2	11	3	0	13	0	1	3	0	0	0	45	0	31	2	0	11	128
41	2	0	1	6	3	1	4	306	10	106	0	0	13	0	0	8	538	1	47	4	1	172	1223
42	0	0	0	0	0	0	1	0	20	4	0	0	0	0	0	3	22	0	23	0	0	3	76
51	3	5	6	6	7	2	1	312	12	1993	6	0	47	5	0	15	81	3	127	34	6	144	2815
52	0	0	0	0	0	0	0	2	2	2	12	0	0	0	0	0	2	0	3	0	0	0	23
53	0	0	0	0	0	0	1	5	0	18	0	4	0	0	0	0	8	0	7	0	0	1	44
61	1	1	0	3	2	0	0	15	0	35	0	0	88	8	0	7	20	2	7	3	8	46	246
62	0	0	0	0	0	0	0	2	0	4	0	0	2	40	3	0	2	0	4	4	0	0	61
63	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	1	5
70	1	0	0	0	0	1	0	12	1	9	0	0	4	0	0	81	6	0	7	1	17	19	159
81	0	28	4	373	15	1	28	160	6	125	1	21	22	0	0	6	1198	8	63	3	4	53	2119
82	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0	12	2	0	0	0	3	22
91	1	15	6	167	37	7	27	34	10	79	2	8	12	4	0	6	10	0	824	12	5	49	1315
92	0	0	2	12	3	1	6	5	1	36	0	2	1	4	0	1	2	0	9	57	0	14	156
1	0	0	0	0	0	0	0	9	0	11	0	0	4	1	0	7	4	0	1	2	61	4	104
2	1	4	5	9	7	0	6	122	1	159	0	1	34	1	0	18	99	5	66	28	1	882	1449
TOTAL	19	95	60	619	193	36	128	1216	76	2817	23	44	239	63	5	160	2116	21	1313	156	105	1461	10965

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 22 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 22

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
21	0	1	0	1	0	1	2	17	1	6	0	0	3	0	0	0	8	0	1	1	0	2	44
22	0	0	1	1	0	0	1	8	0	2	0	0	1	0	0	1	3	0	2	0	0	1	21
31	0	15	0	10	3	1	20	242	4	87	0	4	5	0	0	4	36	1	14	4	0	23	473
32	0	0	0	2	9	0	4	7	0	5	0	0	1	0	0	0	4	0	2	2	0	0	36
33	0	2	0	0	2	15	3	12	0	7	1	0	0	0	0	0	0	0	2	0	0	4	48
34	0	2	0	2	1	1	26	26	0	10	0	0	2	0	0	0	56	0	16	0	0	7	149
41	0	1	6	23	1	0	5	664	7	141	0	4	38	0	0	15	833	12	41	8	9	256	2064
42	0	0	0	0	0	0	0	2	17	6	0	0	1	0	0	0	22	0	4	0	0	10	62
51	0	0	1	2	0	5	3	313	11	998	4	1	51	0	0	17	44	13	35	15	9	93	1615
52	0	0	0	0	0	0	0	1	1	3	9	0	0	0	0	0	0	0	0	0	0	0	14
53	0	0	0	0	1	0	0	36	1	24	0	8	5	0	0	3	8	0	3	0	0	6	95
61	0	1	2	2	1	1	0	46	0	39	0	1	184	5	0	9	24	2	7	3	18	76	421
62	0	0	0	0	0	0	0	1	0	1	0	0	1	23	0	0	0	0	1	6	0	3	36
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	23	0	18	0	0	6	0	0	40	5	1	3	1	2	24	123
81	0	17	4	385	13	6	58	390	11	71	0	57	28	0	0	9	493	3	49	0	3	59	1656
82	0	0	0	3	1	2	1	2	0	23	0	2	0	0	0	0	1	21	2	1	0	1	60
91	0	3	4	33	3	10	18	46	2	31	0	13	15	0	0	4	6	0	300	7	0	13	508
92	0	1	0	1	1	2	7	3	0	20	0	2	2	8	0	1	0	0	2	52	0	2	104
1	0	0	0	0	0	0	0	13	0	8	0	0	18	0	0	2	1	0	4	0	91	2	139
2	2	1	3	8	0	3	1	208	7	108	0	4	60	0	0	17	113	7	21	4	8	741	1316
TOTAL	2	44	21	473	36	47	149	2060	62	1609	14	96	421	36	0	122	1657	60	509	104	140	1323	8985

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 24 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 24

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	2	0	0	1	0	0	0	0	1	0	0	0	1	0	1	0	0	2	8
21	0	1	0	9	2	2	1	14	1	20	0	0	3	0	1	1	13	0	9	0	0	18	95
22	0	0	1	0	0	0	0	1	0	4	1	0	0	1	0	1	0	0	1	0	0	1	11
31	1	2	0	5	3	2	1	49	9	55	1	1	11	0	0	1	10	0	9	3	0	50	213
32	1	2	0	1	23	2	3	7	1	15	4	0	2	1	1	1	2	0	10	1	0	8	85
33	0	0	0	0	3	20	5	6	1	8	0	0	1	0	1	0	1	0	5	0	0	5	56
34	0	1	0	1	0	1	6	1	0	2	0	0	1	1	0	1	30	0	39	0	0	8	92
41	0	1	0	1	0	2	1	198	5	48	1	0	35	2	1	11	505	1	21	1	2	185	1021
42	0	1	0	0	0	0	0	3	30	6	1	0	5	0	1	2	29	0	54	0	0	41	173
51	3	1	3	2	1	4	0	191	17	1474	50	2	77	11	7	12	28	3	43	4	2	333	2268
52	0	1	1	0	2	1	0	9	3	34	95	0	4	0	0	0	1	1	11	2	0	21	186
53	0	0	1	0	0	0	0	12	4	15	1	0	1	1	0	4	3	0	4	0	0	4	50
61	0	4	0	0	0	0	0	41	5	46	3	0	143	18	2	14	34	1	15	3	1	158	488
62	0	0	0	0	0	0	0	12	2	8	0	0	8	53	3	5	5	0	5	0	0	37	138
63	0	0	0	0	0	0	0	3	0	3	0	0	3	1	35	4	0	0	3	0	0	16	68
70	0	0	0	0	0	1	0	13	2	12	0	0	13	5	0	90	9	0	19	0	3	79	246
81	0	44	0	148	4	3	13	176	12	105	6	29	49	10	1	29	277	1	34	2	1	114	1058
82	0	0	0	1	0	0	0	0	0	5	1	0	0	0	0	1	0	0	0	0	0	1	9
91	1	26	3	37	30	12	51	33	21	27	3	16	13	11	2	19	4	0	473	1	3	79	865
92	1	0	0	1	11	1	1	1	0	0	0	1	1	0	0	0	0	0	3	11	0	3	35
1	0	0	0	0	0	0	1	3	0	4	0	0	3	0	0	2	1	0	0	0	18	3	35
2	1	11	1	7	4	5	9	238	60	374	19	1	120	26	12	47	105	2	106	7	5	1487	2647
TOTAL	8	95	10	213	85	56	92	1012	173	2265	186	50	494	141	67	245	1058	9	865	35	35	2653	9847

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 75 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 25

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	1	1	2	0	0	2	0	0	0	3	0	3	0	0	3	15
21	0	1	1	8	5	8	2	22	2	20	2	0	17	1	0	1	9	3	11	3	0	22	138
22	0	0	2	0	1	1	1	1	0	1	0	0	1	0	0	3	1	0	2	0	0	3	17
31	0	14	0	10	9	5	11	115	12	110	5	1	13	0	0	5	19	1	20	4	0	16	370
32	0	4	0	0	44	1	3	13	2	24	4	0	12	0	0	4	4	0	15	5	0	21	156
33	0	1	1	0	6	27	6	7	3	11	2	0	1	0	0	3	2	0	7	1	0	3	81
34	0	0	0	1	0	0	5	0	0	3	0	0	1	0	0	0	47	0	34	1	0	5	97
41	2	4	1	0	0	0	1	233	8	49	2	0	38	0	3	20	788	3	39	5	1	81	1278
42	0	1	0	0	0	0	0	7	43	4	1	0	3	0	0	1	45	0	38	0	0	15	158
51	4	5	0	0	0	1	1	314	21	1760	50	0	103	7	1	50	72	8	79	13	1	122	2612
52	0	1	0	0	0	0	0	25	7	32	173	0	8	0	0	1	2	0	7	2	0	10	268
53	1	0	0	0	0	0	0	14	0	24	0	1	3	1	0	1	27	0	3	0	0	1	76
61	0	3	1	0	0	1	0	50	5	58	3	1	377	38	14	36	106	9	38	8	3	194	945
62	1	0	0	0	1	0	0	4	0	9	0	0	16	71	2	4	6	1	3	2	0	23	143
63	0	0	0	0	0	0	0	0	1	3	0	0	9	0	17	2	2	0	1	2	0	4	41
70	0	1	0	1	1	0	0	35	1	39	2	0	39	2	0	274	30	4	21	3	4	106	563
81	1	48	1	277	8	6	18	251	22	227	12	57	111	6	1	46	841	2	84	3	1	69	2092
82	0	1	0	0	0	0	1	3	0	25	0	0	14	2	1	3	0	8	2	0	0	2	62
91	3	48	5	69	35	31	30	61	10	46	5	12	27	4	0	24	19	2	643	9	2	27	1112
92	0	1	1	2	46	0	13	1	1	6	0	4	6	1	0	2	0	0	3	21	0	3	111
1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	8	2	0	1	0	6	1	22
2	4	5	4	3	2	0	4	116	18	155	7	0	140	10	2	77	68	21	57	29	3	1304	2029
TOTAL	16	138	17	371	158	81	97	1274	157	2610	268	76	941	143	41	565	2093	62	1111	111	21	2035	12386

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 26 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 26

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	2	0	3	0	0	1	1	0	0	0	0	0	0	0	1	8
21	1	3	6	17	44	2	16	62	9	48	3	4	32	3	0	0	7	2	15	1	0	39	314
22	1	1	9	0	10	1	3	11	2	8	0	0	5	1	0	0	0	0	2	0	0	8	62
31	0	17	7	12	33	1	16	26	5	40	2	0	17	3	1	0	3	1	11	1	0	31	227
32	0	5	9	0	136	0	22	41	11	66	1	4	21	2	1	0	11	1	21	5	0	30	387
33	0	0	0	0	1	12	0	5	1	4	2	0	1	0	0	0	1	0	1	0	0	4	32
34	0	4	0	0	6	0	13	3	1	6	0	1	8	0	0	0	85	2	34	0	0	49	212
41	0	3	0	1	6	2	3	131	2	53	1	1	44	3	0	0	302	2	20	1	0	262	837
42	1	0	0	0	0	0	0	4	30	6	0	0	0	0	0	0	11	1	44	0	0	39	136
51	1	6	8	2	13	6	3	179	20	1077	29	4	93	21	2	2	120	27	55	7	0	134	1809
52	1	0	0	0	0	0	0	7	4	16	79	0	3	1	0	0	1	0	3	0	0	5	120
53	0	1	0	0	5	0	2	8	1	14	1	6	2	2	0	0	30	0	4	0	0	7	83
61	0	1	1	1	1	3	0	24	3	60	0	0	105	32	4	2	172	13	22	4	0	132	580
62	0	2	0	0	0	0	0	9	1	16	0	0	10	37	1	0	1	7	1	2	0	34	121
63	0	0	0	0	0	0	0	1	0	6	0	0	2	1	11	0	0	2	4	2	0	6	35
70	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	6	0	0	0	0	0	5	16
81	1	183	9	146	46	2	68	117	14	128	1	50	70	2	1	2	1462	10	13	4	0	143	2472
82	0	1	0	0	4	0	9	1	1	69	0	2	10	1	4	0	1	9	1	1	0	2	116
91	0	75	9	42	65	2	42	17	12	16	0	10	17	1	2	1	12	3	636	2	0	45	1009
92	0	0	2	1	1	0	2	1	0	13	0	0	0	0	0	0	6	1	6	19	0	12	64
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	15	3	5	17	1	13	185	18	144	1	2	135	11	8	3	248	35	117	14	0	973	1950
TOTAL	8	317	63	227	388	32	212	834	135	1793	120	84	580	123	35	16	2473	116	1010	63	0	1961	10590

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 32 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 32

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	2	0	0	0	0	1	5
21	1	6	2	6	3	4	3	23	2	32	2	0	29	0	0	8	21	2	9	2	0	34	189
22	0	0	4	1	1	1	1	2	0	4	0	0	4	0	0	2	1	0	3	0	0	11	35
31	1	10	0	4	4	4	10	53	3	44	0	2	17	0	0	7	16	0	11	1	0	22	209
32	0	3	0	0	31	1	6	10	2	30	2	0	21	0	0	12	6	0	15	5	2	45	191
33	0	3	1	0	2	18	11	10	2	9	1	0	5	0	0	3	0	0	7	0	0	4	76
34	0	2	1	0	1	3	10	4	2	7	2	0	2	0	0	5	56	2	64	0	1	7	169
41	0	2	0	1	0	1	2	110	7	27	1	1	25	2	0	19	488	4	26	0	3	66	785
42	0	0	0	0	0	0	0	3	25	0	1	0	2	0	0	4	20	1	35	0	0	13	104
51	0	1	1	1	1	5	2	179	9	1402	37	2	95	4	3	65	58	15	64	23	5	139	2111
52	0	1	0	0	0	1	0	15	5	28	78	0	5	3	0	3	2	3	13	3	0	15	175
53	0	0	0	0	1	1	2	26	1	51	7	1	26	0	0	9	98	3	6	1	2	14	249
61	0	1	0	0	0	4	1	44	3	55	1	0	226	29	2	55	209	6	44	7	11	185	883
62	0	0	0	0	0	0	0	4	1	11	0	0	6	84	4	3	4	3	6	3	1	23	153
63	0	0	0	0	0	0	0	1	0	3	0	0	1	0	9	1	0	0	1	2	0	2	20
70	0	4	1	1	1	2	4	30	7	59	3	1	72	3	1	351	50	8	36	14	17	162	827
81	1	99	10	160	13	5	29	156	21	144	17	168	113	3	0	64	1853	3	30	10	6	98	3003
82	0	1	0	1	4	0	1	4	1	25	2	14	13	3	0	5	0	7	1	0	1	2	85
91	1	38	12	31	62	24	76	23	9	19	6	36	24	3	0	36	12	2	340	3	2	45	804
92	0	3	2	1	62	1	10	1	0	4	0	19	3	0	0	13	0	0	3	16	0	4	142
1	0	1	0	0	0	0	0	3	0	3	1	0	8	1	0	42	2	0	6	4	98	22	191
2	1	16	2	3	5	2	2	84	4	148	15	6	183	19	1	124	107	25	85	47	41	1776	2696
TOTAL	5	191	36	210	191	77	170	785	104	2106	176	250	880	154	20	832	3005	84	805	141	190	2690	13102

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 30 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 36

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	2	0	0	0	0	C	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	5
21	0	0	0	1	2	C	0	6	0	4	0	0	0	0	0	0	1	0	0	0	0	10	24
22	0	0	5	0	1	0	1	2	0	6	0	1	2	0	0	2	3	0	1	1	1	7	33
31	0	6	1	6	3	1	4	66	3	73	3	1	3	0	0	2	10	0	8	4	1	26	221
32	0	1	1	1	53	0	2	11	2	45	1	0	3	0	0	0	4	0	10	8	0	20	162
33	0	0	0	2	7	9	0	1	0	5	2	0	0	0	0	0	0	0	2	5	0	4	37
34	0	0	0	0	1	2	0	0	0	2	0	0	0	0	0	0	14	0	14	2	0	4	39
41	0	1	2	2	0	0	1	45	1	20	0	0	11	0	0	2	267	8	21	12	1	86	480
42	0	0	0	0	0	0	0	0	9	2	0	0	0	0	0	1	12	0	5	0	0	11	40
51	1	C	5	0	2	3	1	149	14	2635	76	0	92	1	0	11	46	18	156	85	2	336	3633
52	0	0	0	0	0	0	0	6	2	52	148	0	0	0	0	0	0	0	9	5	0	22	244
53	0	C	0	0	0	0	0	10	0	15	1	0	1	0	0	1	1	1	4	0	0	13	47
61	0	0	0	0	1	0	0	10	0	41	0	0	58	5	0	1	30	0	17	20	0	72	255
62	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	0	0	0	0	0	4	9
63	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7C	1	0	0	0	0	0	0	8	0	2	0	0	5	0	0	33	2	0	5	3	15	10	84
81	0	9	9	175	19	0	6	36	1	74	1	21	21	0	0	0	1224	1	10	3	4	106	1720
82	0	C	0	0	0	0	0	1	0	45	0	0	0	0	0	0	1	3	1	0	0	2	53
91	0	4	2	26	42	9	16	12	4	113	2	17	8	0	0	6	6	0	269	20	8	75	639
92	1	0	0	1	29	13	6	1	0	129	4	1	4	0	0	0	2	0	8	61	0	8	268
1	0	0	2	0	0	C	0	2	0	6	0	0	3	0	0	9	0	0	8	1	46	3	80
2	0	3	5	7	2	1	2	105	4	351	6	6	48	1	0	14	97	22	92	38	2	1118	1924
TOTAL	5	24	32	221	162	38	39	471	40	3625	244	47	259	9	0	82	1720	53	640	268	81	1937	9997

INTERACTION ANALYSIS - FREQUENCIES
TEACHER AC - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 40

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21	0	1	2	4	3	0	0	12	2	18	1	2	1	0	0	1	9	3	9	1	2	10	81
22	0	0	7	0	1	0	0	3	1	3	0	1	1	0	0	0	0	3	2	0	0	1	23
31	0	7	1	0	7	0	2	25	1	23	0	0	3	0	0	0	13	4	4	0	4	7	101
32	0	2	1	0	7	0	0	3	0	4	1	0	0	0	0	0	2	1	4	0	1	6	32
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	7	0	0	1	12
41	0	2	0	0	0	0	0	266	5	32	1	7	11	1	0	2	507	13	5	1	13	58	924
42	0	0	1	0	0	0	0	2	31	3	1	3	2	1	0	2	16	1	7	0	0	13	83
51	0	4	2	0	0	0	0	189	9	1413	13	26	85	21	1	18	135	104	36	0	52	142	2250
52	0	0	0	0	0	0	0	3	2	9	43	0	0	1	0	0	1	3	4	0	2	3	71
53	1	0	0	0	0	0	0	16	5	34	1	65	29	1	0	18	38	8	5	0	13	16	250
61	0	2	1	0	0	0	0	26	1	43	0	20	196	22	0	12	45	59	3	1	25	84	540
62	0	1	0	0	0	0	0	6	0	22	2	3	7	80	0	1	10	26	2	2	4	14	180
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
70	0	0	1	0	0	0	0	11	1	11	0	6	11	4	0	141	12	8	8	0	24	26	264
81	0	37	1	80	3	0	0	204	11	255	3	60	39	6	0	9	1577	43	33	0	46	199	2606
82	0	5	0	0	0	0	0	17	1	161	0	14	76	31	0	3	16	39	3	1	13	25	405
91	0	17	3	16	5	0	9	13	2	27	4	8	6	3	0	3	8	3	104	0	11	21	263
92	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	1	0	1	2	0	2	10
1	0	1	1	0	1	0	0	32	0	47	1	14	29	2	0	41	20	15	7	0	533	13	757
2	0	2	2	1	2	0	1	91	11	137	0	18	42	7	0	10	191	68	18	2	20	476	1099
TOTAL	1	81	23	101	32	0	12	920	83	2244	71	247	538	180	1	261	2604	402	262	10	763	1117	9953

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 4P · PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 48

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	3
21	0	0	2	9	5	0	5	20	3	39	1	1	6	1	0	2	20	0	10	3	0	27	154
22	0	0	8	0	0	0	0	2	1	3	1	0	3	0	1	1	7	0	1	0	1	4	33
31	0	12	2	3	7	0	3	39	1	37	8	2	8	0	1	4	28	2	15	1	2	27	202
32	0	2	1	0	32	0	2	8	1	11	4	0	4	0	1	2	9	1	22	1	0	10	111
33	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	2
34	0	0	0	0	0	0	2	0	0	1	0	0	1	0	0	1	22	0	14	2	0	2	45
41	0	0	2	0	2	0	1	126	2	12	1	1	14	1	1	9	356	0	17	1	2	53	601
42	0	0	1	0	0	0	0	2	4	1	0	0	2	0	0	0	8	0	23	0	1	2	44
51	0	8	3	1	0	1	0	89	4	667	17	3	45	11	4	7	71	8	49	15	15	138	1156
52	0	1	1	1	0	0	0	13	2	8	103	0	0	0	0	1	2	0	14	1	3	10	160
53	0	3	0	1	0	0	0	8	1	37	1	3	7	0	0	0	105	1	5	2	0	4	178
61	0	0	0	0	0	0	0	18	0	22	2	0	56	6	1	9	75	7	13	1	1	77	288
62	0	0	0	0	0	0	0	1	0	1	0	0	2	17	3	3	6	1	2	0	0	9	45
63	0	0	1	0	0	0	0	2	0	2	0	0	1	1	42	0	1	0	3	1	0	10	64
70	0	1	2	0	0	0	0	9	1	7	1	0	5	2	1	83	23	0	8	4	12	42	201
81	1	81	5	136	7	0	1	152	8	128	8	133	43	2	0	24	1247	3	51	6	4	78	2118
82	0	1	0	0	0	0	0	1	0	22	0	3	8	1	1	2	0	2	0	0	1	1	43
91	2	35	4	47	35	1	24	17	8	22	6	16	13	0	2	13	22	1	389	13	9	29	708
92	0	0	1	2	20	0	5	3	0	1	1	5	1	0	0	1	2	0	13	26	2	12	95
1	0	1	0	0	0	0	0	4	0	11	3	1	3	0	0	14	9	3	9	1	159	7	225
2	0	9	1	2	3	0	2	80	7	126	3	10	65	3	6	23	102	14	48	17	15	582	1118
TOTAL	3	154	34	202	111	2	45	594	43	1160	160	178	287	45	64	199	2115	43	707	95	227	1126	7594

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 5E - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 58

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	1	1	13	12	0	2	59	8	45	1	1	22	2	0	1	33	1	29	2	2	34	269
22	0	0	7	1	3	0	0	3	0	1	0	0	0	0	0	0	1	0	4	0	0	1	21
31	0	18	0	4	7	0	5	124	11	61	2	4	27	2	0	3	63	5	17	1	2	46	402
32	0	1	2	1	36	0	3	4	2	13	4	0	6	1	0	0	3	1	13	0	0	9	99
33	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3
34	0	1	0	0	1	0	7	0	0	1	0	0	1	1	0	0	10	0	24	0	0	3	49
41	0	3	0	19	1	0	0	356	5	35	0	9	28	2	0	13	741	6	19	0	2	165	1404
42	0	0	0	1	0	0	0	3	44	3	1	2	4	0	0	3	53	0	39	0	0	16	169
51	0	7	1	4	3	0	2	215	17	1774	14	10	120	11	0	21	101	17	100	10	21	209	2657
52	0	0	0	0	1	0	0	5	0	14	77	0	9	0	0	0	1	0	15	1	0	3	126
53	0	0	0	2	1	0	1	32	3	32	1	27	16	5	0	7	79	3	17	1	2	14	243
61	0	0	0	2	1	0	0	47	5	49	1	10	104	21	0	12	304	13	29	2	11	148	759
62	0	0	0	0	0	0	0	8	1	10	0	1	6	101	1	2	7	13	8	0	1	36	195
63	0	0	0	0	0	0	0	2	0	2	0	1	1	0	7	0	0	1	0	0	0	0	14
70	0	0	0	1	0	0	0	19	0	10	0	2	31	3	0	70	4	0	12	0	9	17	178
81	0	148	4	315	3	0	3	341	42	267	4	112	117	5	1	17	2476	5	49	5	5	154	4073
82	0	1	0	1	0	0	0	3	0	36	0	4	30	18	3	1	2	4	1	2	1	4	111
91	0	83	5	33	25	2	24	23	17	62	10	37	40	3	2	7	7	1	787	4	9	36	1217
92	0	0	0	0	2	0	1	1	0	17	3	0	1	1	0	0	1	0	3	20	0	1	51
1	0	1	0	0	0	0	0	5	0	30	0	4	15	0	0	5	2	3	8	0	194	5	272
2	0	5	1	5	3	0	1	145	13	198	8	17	170	21	0	17	191	38	39	3	14	844	1733
TOTAL	0	269	21	402	99	3	49	1395	168	2660	126	241	748	197	14	179	4079	111	1215	51	273	1745	14045

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 68 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 68

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	1	6	4	0	1	13	8	32	0	1	0	0	0	0	8	0	4	0	1	1	80
22	0	0	0	2	1	0	2	2	1	6	1	0	0	0	0	0	0	0	0	0	0	0	15
31	0	7	0	17	19	0	6	80	6	202	6	8	5	0	0	1	24	0	14	0	3	7	405
32	0	2	0	0	24	1	2	14	3	11	3	0	0	0	0	0	3	0	7	0	0	0	70
33	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2
34	0	0	0	3	1	0	5	3	0	3	0	0	0	0	0	0	15	0	8	1	0	2	41
41	0	3	1	27	1	0	0	438	3	84	5	4	7	1	0	1	775	2	3	0	2	150	1507
42	0	0	0	1	0	1	0	2	22	6	2	0	1	0	0	0	24	0	30	0	0	8	97
51	0	4	6	5	4	0	1	567	28	6584	101	2	96	8	0	33	55	1	36	3	37	165	7736
52	0	0	1	0	1	0	0	27	8	84	398	0	3	4	0	1	2	0	5	0	5	12	551
53	0	2	0	2	1	0	1	24	1	37	2	15	1	0	0	3	33	0	1	0	1	3	127
61	0	0	0	0	0	0	0	16	2	54	2	0	150	22	0	11	44	0	6	0	6	58	371
62	0	0	0	0	0	0	0	6	1	12	5	0	7	118	0	3	2	1	4	0	0	14	173
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	1	0	0	0	9	0	23	0	1	19	5	0	116	2	0	8	0	10	8	202
81	0	43	5	288	7	0	6	191	4	347	7	84	16	1	0	8	662	1	15	0	8	67	1760
82	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	1	0	0	0	1	0	0	6
91	0	14	1	43	7	0	16	9	3	19	6	9	7	3	0	4	1	0	385	1	2	13	543
92	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	1	4	0	0	11
1	0	0	0	0	0	0	0	11	1	44	3	0	3	0	0	9	3	0	1	0	56	7	138
2	0	5	0	10	0	0	1	91	6	175	9	5	57	11	0	9	107	1	15	1	5	289	797
TOTAL	0	80	15	405	70	2	41	1503	97	7731	552	129	372	174	0	200	1760	6	544	11	136	804	14632

INTERACTION ANALYSIS - FREQUENCIES
TEACHER 70 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 70

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	2	0	0	0	0	0	5
21	0	2	2	5	14	1	3	7	5	29	0	0	6	0	0	2	3	2	14	0	1	27	123
22	0	0	9	1	3	0	2	4	0	3	0	0	5	0	0	0	1	1	3	0	0	7	39
31	0	11	2	8	16	0	12	13	5	24	1	1	1	0	1	0	6	1	17	1	0	26	146
32	0	5	3	0	74	3	8	7	2	34	1	1	7	1	0	0	6	2	28	4	1	23	210
33	0	0	0	0	0	25	3	0	0	8	0	0	0	1	0	0	0	0	4	0	0	3	44
34	0	4	0	1	1	0	10	2	1	8	0	1	0	0	0	1	34	1	33	2	0	22	121
41	0	1	0	3	1	0	1	81	2	23	0	0	3	2	1	2	135	4	25	1	3	83	371
42	0	0	0	0	1	0	0	4	46	6	0	0	1	0	1	0	8	0	27	0	1	30	125
51	1	7	3	0	14	7	4	99	20	1812	83	0	48	5	7	14	103	34	177	14	19	161	2632
52	0	0	0	0	1	0	0	4	1	60	68	0	2	0	0	0	0	0	12	3	2	3	156
53	0	0	0	0	2	0	1	2	0	11	0	0	1	0	0	1	5	0	2	0	1	6	32
61	1	0	3	0	1	1	1	10	2	32	1	0	41	13	1	3	11	2	22	1	14	51	211
62	0	0	0	0	0	0	0	0	0	7	0	0	4	13	0	0	0	0	6	1	1	11	43
63	0	0	0	0	1	0	0	1	1	2	0	0	2	1	10	0	1	3	2	0	0	1	25
70	0	0	1	0	0	0	2	1	1	21	0	0	5	2	0	38	4	1	6	0	18	15	115
81	1	29	3	57	14	2	20	29	7	113	0	18	7	1	0	5	299	3	30	1	10	83	732
82	0	1	0	2	2	0	3	1	0	52	0	0	5	1	4	1	1	10	9	0	2	12	106
91	0	54	7	61	45	2	34	28	6	113	0	7	17	2	0	10	3	8	629	9	36	124	1195
92	0	0	0	3	5	0	3	1	0	16	0	0	1	0	0	0	4	0	8	5	1	6	53
1	0	1	1	0	2	0	0	8	1	35	0	1	16	1	0	20	9	6	18	5	316	5	445
2	2	8	4	5	13	3	14	69	24	209	1	3	44	1	1	18	95	28	122	6	19	595	1284
TOTAL	5	123	38	146	210	44	121	371	124	2620	156	32	216	44	26	115	730	106	1194	53	445	1294	8213

Master 22 x 22 Probability Matrices for Each Teacher:--On the next sixteen pages are master probability matrices for each teacher. The total number of tallies on which each matrix is based can be found in the lower right hand corner. All cell frequencies and column totals, other than the grand total, have been converted into events per 1,000. This means that cell frequencies and column totals can be compared directly, one matrix with another.

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 11 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 ULFID 66A 11

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21	0	0	1	1	3	0	1	2	1	2	0	0	2	0	0	0	2	0	2	0	0	4	21
22	0	0	2	0	1	0	1	1	0	2	0	0	1	0	0	0	1	0	1	0	0	2	14
31	0	1	1	2	3	0	2	3	1	3	1	0	1	0	0	0	2	0	2	0	0	3	25
32	0	0	0	0	10	1	1	2	1	4	1	0	2	0	0	0	2	0	4	0	0	3	32
33	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	6
34	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	13	0	8	0	0	2	30
41	0	0	0	0	0	0	0	7	1	3	0	0	2	0	0	0	41	0	3	0	0	7	65
42	0	0	0	0	0	0	0	1	4	1	0	0	0	0	0	0	4	0	9	0	0	2	21
51	0	0	1	0	0	0	0	13	3	83	13	0	7	2	0	0	7	1	7	1	0	11	149
52	0	0	0	0	0	0	0	2	1	7	27	0	2	0	0	0	1	0	4	1	0	2	48
53	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	1	0	0	1	7
61	0	0	0	0	0	0	0	3	0	4	1	0	9	5	0	0	9	0	3	0	0	12	48
62	0	0	0	0	0	0	0	1	0	2	0	0	1	4	0	0	1	0	1	0	0	3	15
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
70	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	4
81	0	10	4	11	5	1	10	14	4	11	1	2	5	1	0	0	87	0	7	0	0	14	188
82	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	5
91	0	6	4	8	6	1	8	3	2	5	1	2	3	1	0	0	3	0	70	1	0	10	134
92	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	1	3	0	1	9
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2	0	2	0	0	1	0	1	12	3	16	1	1	11	1	0	1	13	1	11	1	0	98	176
TOTAL	1	21	14	25	32	6	30	64	21	148	48	7	48	15	2	4	188	5	134	9	1	177	14186

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 13 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 13

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	1	4	2	0	1	2	0	2	0	0	1	0	0	0	1	0	1	0	0	3	20
22	0	0	2	2	2	0	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	2	14
31	0	1	1	4	6	0	2	1	1	2	0	0	1	0	0	0	1	0	3	1	0	6	31
32	0	0	1	0	16	2	1	1	0	5	2	0	1	0	0	0	1	0	3	0	0	4	39
33	0	0	0	0	0	5	0	0	0	2	1	0	1	0	0	0	0	0	1	0	0	1	12
34	0	0	0	0	0	0	3	0	0	1	0	0	1	0	0	0	7	0	5	0	0	2	21
41	0	0	0	1	0	0	0	5	1	1	0	0	0	0	0	0	19	0	2	0	0	7	38
42	0	0	0	0	0	0	0	0	5	1	1	0	1	0	0	0	2	0	3	0	0	3	17
51	0	0	1	0	1	1	1	8	3	153	19	0	9	2	0	1	2	1	6	1	0	13	220
52	0	0	0	0	0	0	0	2	1	12	52	0	2	1	0	0	0	0	3	1	0	6	81
53	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	1	5
61	0	0	0	0	0	0	0	2	1	6	1	0	14	5	0	2	5	0	2	0	0	11	51
62	0	0	0	0	0	0	0	0	0	2	1	0	1	7	0	0	0	0	0	0	0	3	16
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3
70	0	0	0	0	0	0	0	1	0	1	0	0	2	0	0	4	1	0	0	0	0	5	15
81	0	10	3	8	2	0	4	4	1	3	0	3	3	0	0	0	49	0	1	0	0	7	100
82	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	4
91	0	6	4	9	5	0	4	1	1	2	0	1	2	0	0	1	1	0	57	1	0	4	98
92	0	0	0	2	2	0	0	0	0	1	1	0	0	0	0	0	1	0	0	2	0	0	10
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	4
2	0	1	0	2	1	1	1	9	2	20	2	1	11	1	0	4	7	1	9	3	0	126	203
TOTAL	0	20	14	31	39	12	21	38	17	218	81	5	51	16	3	14	100	3	97	10	4	205	11255

INTERACTION ANALYSIS - PROBABILITIES X 1COO - GRANC TCTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 15 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 15

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	C	0	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	1
21	0	C	0	1	1	C	0	2	1	2	1	0	0	0	0	0	2	0	2	1	0	0	12
22	0	C	1	0	0	C	0	1	0	1	C	0	0	0	0	0	0	0	1	0	0	1	5
31	C	C	0	2	2	0	1	5	2	6	1	0	0	0	0	0	4	0	3	1	0	3	30
32	0	C	0	C	9	0	1	1	2	3	1	0	0	0	0	0	0	0	2	1	0	0	21
33	0	C	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
34	0	C	0	C	1	0	5	1	1	1	0	0	0	0	0	0	2	0	8	0	0	2	20
41	0	0	0	0	0	0	0	20	0	3	0	0	1	0	0	0	37	0	1	0	0	10	75
42	0	C	0	0	0	0	0	0	8	1	0	0	1	0	0	0	6	1	13	1	0	7	39
51	0	C	1	C	1	0	0	13	5	184	6	1	6	3	1	0	2	1	7	2	1	14	249
52	0	0	0	0	0	0	0	2	1	5	26	0	0	1	0	0	0	0	1	0	0	1	38
53	0	0	0	0	C	0	0	1	0	1	0	1	0	C	C	0	1	0	1	0	0	1	7
61	C	C	0	0	0	0	0	2	0	3	C	0	9	2	0	0	1	1	1	0	0	9	29
62	0	C	0	0	0	0	0	C	0	3	0	0	1	14	1	C	0	1	0	0	0	2	24
63	0	C	0	C	0	C	0	0	0	1	C	0	0	1	8	0	0	1	0	0	0	0	12
7C	0	C	0	C	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	2
81	0	6	0	18	2	0	1	11	4	9	1	2	2	0	0	0	63	0	3	0	0	7	128
82	C	0	0	0	0	0	0	C	0	2	0	0	1	1	1	0	0	1	0	0	0	0	6
91	0	5	1	6	4	0	11	3	6	5	1	1	1	0	0	0	0	0	99	1	0	8	151
92	0	0	0	1	1	C	0	1	1	1	0	0	0	0	0	0	0	0	2	11	0	1	19
1	0	C	0	0	0	0	0	0	0	1	C	C	0	C	0	0	0	0	0	0	5	0	7
2	C	C	1	1	1	0	1	12	5	17	1	1	5	1	0	1	8	2	8	1	0	59	124
TCTAL	1	12	5	3C	21	3	20	75	38	248	38	7	29	23	12	2	129	6	151	19	7	126	7714

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
     TEACHER 18 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966              66A 18
----------------------------------------------------------------------------------------------------------
CAT.   10  21  22  31  32  33  34  41  42  51  52  53  61  62  63  70  81  82  91  92   1   2  TOTAL
----------------------------------------------------------------------------------------------------------

10      0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0      0
21      0   0   0   0   0   0   0   0   0   1   0   0   0   0   0   0   0   0   0   0   0   0      1
22      0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0      0
31      0   0   0   1   0   0   0   2   0   3   0   0   0   0   0   0   1   0   1   0   0   2     12
32      0   0   0   0   3   0   0   1   0   2   0   0   0   0   0   0   0   0   1   0   0   2      9
33      0   0   0   0   1   1   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0      3
34      0   0   0   0   0   0   1   0   0   0   0   0   0   0   0   0   2   0   3   0   0   3     10
41      0   0   0   0   0   0   0  13   0   3   0   0   1   0   0   0  18   0   3   0   0  16     54
42      0   0   0   0   0   0   0   1   4   0   0   0   0   0   0   0   2   0   3   0   0   3     15
51      0   0   0   0   0   0   0   9   2 294   5   0   3   0   0   1   2   0  11   4   0  33    364
52      0   0   0   0   0   0   0   0   1   2  14   0   0   0   0   0   0   0   0   0   0   3     21
53      0   0   0   0   0   0   0   0   0   1   0   1   0   0   0   0   1   0   1   0   0   2      6
61      0   0   0   0   0   0   0   0   0   2   0   0   5   0   0   0   2   0   2   0   0   6     18
62      0   0   0   0   0   0   0   0   0   0   0   0   0   2   0   0   0   0   0   0   0   1      3
63      0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0      0
70      0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   3   1   0   0   0   1   2      8
81      0   0   0   6   2   0   3   8   1   4   0   2   1   0   0   1  82   0   3   1   0  10    124
82      0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0      0
91      0   0   0   3   2   1   3   3   2   8   1   1   2   0   0   0   1   0  53   1   0  14     95
92      0   0   0   0   0   0   2   0   0   5   0   1   0   0   0   0   0   0   1   3   0   1     14
1       0   0   0   0   0   0   0   1   0   1   0   0   0   0   0   0   0   0   0   0   6   0      9
2       0   0   0   2   0   0   1  16   3  37   0   1   6   0   0   1  12   0  13   3   0 134    230
----------------------------------------------------------------------------------------------------------
TOTAL   0   1   0  12   9   3  10  54  14 364  21   6  19   3   0   8 123   0  95  14   9 231  10416
----------------------------------------------------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 19 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 19

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
21	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	1	0	1	0	0	1	9
22	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	6
31	0	3	0	3	3	1	3	16	1	13	0	1	0	0	0	0	4	0	4	1	0	3	56
32	0	0	0	0	7	0	0	2	0	3	0	0	0	0	0	0	1	0	2	0	0	1	18
33	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3
34	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4	0	3	0	0	1	12
41	0	0	0	1	0	0	0	28	1	10	0	0	1	0	0	1	49	0	4	0	0	16	112
42	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	2	0	0	0	7
51	0	0	1	1	1	0	0	28	1	182	1	0	4	0	0	1	7	0	12	3	1	13	257
52	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
53	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	1	0	0	0	4
61	0	0	0	0	0	0	0	1	0	3	0	0	8	1	0	1	2	0	1	0	1	4	22
62	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	6
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	7	1	0	1	0	2	2	15
81	0	3	0	34	1	0	3	15	1	11	0	2	2	0	0	1	109	1	6	0	0	5	193
82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
91	0	1	1	15	3	1	2	3	1	7	0	1	1	0	0	1	1	0	75	1	0	4	120
92	0	0	0	1	0	0	1	0	0	3	0	0	0	0	0	0	0	0	1	5	0	1	14
1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	6	0	9
2	0	0	0	1	1	0	1	11	0	15	0	0	3	0	0	2	9	0	6	3	0	80	132
TOTAL	2	9	5	56	18	3	12	111	7	257	2	4	22	6	0	15	193	2	120	14	10	133	10965

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 22 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 22

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	1	0	0	0	0	0	5
22	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
31	0	2	0	1	0	0	2	27	0	10	0	0	1	0	0	0	4	0	2	0	0	3	53
32	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4
33	0	0	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5
34	0	0	0	0	0	0	3	3	0	1	0	0	0	0	0	0	6	0	2	0	0	1	17
41	0	0	1	3	0	0	1	74	1	16	0	0	4	0	0	2	93	1	5	1	1	28	230
42	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	2	0	0	0	0	1	7
51	0	0	0	0	0	1	0	35	1	111	0	0	6	0	0	2	5	1	4	2	1	10	180
52	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
53	0	0	0	0	0	0	0	4	0	3	0	1	1	0	0	0	1	0	0	0	0	1	11
61	0	0	0	0	0	0	0	5	0	4	0	0	20	1	0	1	3	0	1	0	2	8	47
62	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	4
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	3	0	2	0	0	1	0	0	4	1	0	0	0	0	3	14
81	0	2	0	43	1	1	6	43	1	8	0	6	3	0	0	1	55	0	5	0	0	7	184
82	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0	7
91	0	0	0	4	0	1	2	5	0	3	0	1	2	0	0	0	1	0	33	1	0	1	57
92	0	0	0	0	0	0	1	0	0	2	0	0	0	1	0	0	0	0	0	6	0	0	12
1	0	0	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	0	10	0	15
2	0	0	0	1	0	0	0	23	1	12	0	0	7	0	0	2	13	1	2	0	1	82	146
TOTAL	0	5	2	53	4	5	17	229	7	179	2	11	47	4	0	14	184	7	57	12	16	147	8985

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 24 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 24

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21	0	0	0	1	0	0	0	1	0	2	0	0	0	0	0	0	1	0	1	0	0	2	10
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
31	0	0	0	1	0	0	0	5	1	6	0	0	1	0	0	0	1	0	1	0	0	5	22
32	0	0	0	0	2	0	0	1	0	2	0	0	0	0	0	0	0	0	1	0	0	1	9
33	0	0	0	0	0	2	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	1	6
34	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	4	0	0	1	9
41	0	0	0	0	0	0	0	20	1	5	0	0	4	0	0	1	51	0	2	0	0	19	104
42	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	0	3	0	5	0	0	4	18
51	0	0	0	0	0	0	0	19	2	150	5	0	8	1	1	1	3	0	4	0	0	34	230
52	0	0	0	0	0	0	0	1	0	3	10	0	0	0	0	0	0	0	1	0	0	2	19
53	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	5
61	0	0	0	0	0	0	0	4	1	5	0	0	15	2	0	1	3	0	2	0	0	16	50
62	0	0	0	0	0	0	0	1	0	1	0	0	1	5	0	1	1	0	1	0	0	4	14
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	2	7
70	0	0	0	0	0	0	0	1	0	1	0	0	1	1	0	9	1	0	2	0	0	8	25
81	0	4	0	15	0	0	1	18	1	11	1	3	5	1	0	3	28	0	3	0	0	12	107
82	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
91	0	3	0	4	3	1	5	3	2	3	0	2	1	1	0	2	0	0	48	0	0	8	88
92	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4
2	0	1	0	1	0	1	1	24	6	38	2	0	12	3	1	5	11	0	11	1	1	151	269
TOTAL	1	10	1	22	9	6	9	103	18	230	19	5	50	14	7	25	107	1	88	4	4	269	9847

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 25 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 25

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21	0	0	0	1	0	1	0	2	0	2	0	0	1	0	0	0	1	0	1	0	0	2	11
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
31	0	1	0	1	1	0	1	9	1	9	0	0	1	0	0	0	2	0	2	0	0	1	30
32	0	0	0	0	4	0	0	1	0	2	0	0	1	0	0	0	0	0	1	0	0	2	13
33	0	0	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	7
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	0	0	8
41	0	0	0	0	0	0	0	19	1	4	0	0	3	0	0	2	64	0	3	0	0	7	103
42	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	4	0	3	0	0	1	13
51	0	0	0	0	0	0	0	25	2	142	4	0	8	1	0	4	6	1	6	1	0	10	211
52	0	0	0	0	0	0	0	2	1	3	14	0	1	0	0	0	0	0	1	0	0	1	22
53	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	2	0	0	0	0	0	6
61	0	0	0	0	0	0	0	4	0	5	0	0	30	3	1	3	9	1	3	1	0	16	76
62	0	0	0	0	0	0	0	0	0	1	0	0	1	6	0	0	0	0	0	0	0	2	12
63	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	3
70	0	0	0	0	0	0	0	3	0	3	0	0	3	0	0	22	2	0	2	0	0	9	45
81	0	4	0	22	1	0	1	20	2	18	1	5	9	0	0	4	68	0	7	0	0	6	169
82	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	1	0	0	0	0	5
91	0	4	0	6	3	3	2	5	1	4	0	1	2	0	0	2	2	0	52	1	0	2	90
92	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	9
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
2	0	0	0	0	0	0	0	9	1	13	1	0	11	1	0	6	5	2	5	2	0	105	164
TOTAL	1	11	1	30	13	7	8	103	13	211	22	6	76	12	3	46	169	5	90	9	2	164	12386

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 26 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 26

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21	0	0	1	2	4	0	2	6	1	5	0	0	3	0	0	0	1	0	1	0	0	4	30
22	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	6
31	0	2	1	1	3	0	2	2	0	4	0	0	2	0	0	0	0	0	1	0	0	3	21
32	0	0	1	0	13	0	2	4	1	6	0	0	2	0	0	0	1	0	2	0	0	3	37
33	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
34	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	8	0	3	0	0	5	20
41	0	0	0	0	1	0	0	12	0	5	0	0	4	0	0	0	29	0	2	0	0	25	79
42	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	1	0	4	0	0	4	13
51	0	1	1	0	1	1	0	17	2	102	3	0	9	2	0	0	11	3	5	1	0	13	171
52	0	0	0	0	0	0	0	1	0	2	7	0	0	0	0	0	0	0	0	0	0	0	11
53	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	3	0	0	0	0	1	8
61	0	0	0	0	0	0	0	2	0	6	0	0	10	3	0	0	16	1	2	0	0	12	55
62	0	0	0	0	0	0	0	1	0	2	0	0	1	3	0	0	0	1	0	0	0	3	11
63	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	3
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
81	0	17	1	14	4	0	6	11	1	12	0	5	7	0	0	0	138	1	1	0	0	14	233
82	0	0	0	0	0	0	1	0	0	7	0	0	1	0	0	0	0	1	0	0	0	0	11
91	0	7	1	4	6	0	4	2	1	2	0	1	2	0	0	0	1	0	60	0	0	4	95
92	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	2	0	1	6
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	1	0	0	2	0	1	17	2	14	0	0	13	1	1	0	23	3	11	1	0	92	184
TOTAL	1	30	6	21	37	3	20	79	13	169	11	8	55	12	3	2	234	11	95	6	0	185	10590

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 32 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 32

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	2	0	2	0	0	2	0	0	1	2	0	1	0	0	3	14
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
31	0	1	0	0	0	0	1	4	0	3	0	0	1	0	0	1	1	0	1	0	0	2	16
32	0	0	0	0	2	0	0	1	0	2	0	0	2	0	0	1	0	0	1	0	0	3	15
33	0	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	6
34	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	4	0	5	0	0	1	13
41	0	0	0	0	0	0	0	8	1	2	0	0	2	0	0	1	37	0	2	0	0	5	60
42	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	3	0	0	1	8
51	0	0	0	0	0	0	0	14	1	107	3	0	7	0	0	5	4	1	5	2	0	11	161
52	0	0	0	0	0	0	0	1	0	2	6	0	0	0	0	0	0	0	1	0	0	1	13
53	0	0	0	0	0	0	0	2	0	4	1	0	2	0	0	1	7	0	0	0	0	1	19
61	0	0	0	0	0	0	0	3	0	4	0	0	17	2	0	4	16	0	3	1	1	14	67
62	0	0	0	0	0	0	0	0	0	1	0	0	0	6	0	0	0	0	0	0	0	2	12
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2
70	0	0	0	0	0	0	0	2	1	5	0	0	5	0	0	27	4	1	3	1	1	12	63
81	0	8	1	12	1	0	2	12	2	11	1	13	9	0	0	5	141	0	2	1	0	7	229
82	0	0	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	1	0	0	0	0	6
91	0	3	1	2	5	2	6	2	1	1	0	3	2	0	0	3	1	0	26	0	0	3	61
92	0	0	0	0	5	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	11
1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	7	2	15
2	0	1	0	0	0	0	0	6	0	11	1	0	14	1	0	9	8	2	6	4	3	136	206
TOTAL	0	15	3	16	15	6	13	60	8	161	13	19	67	12	2	64	229	6	61	11	15	205	13102

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 36 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 36

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
22	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	3
31	0	1	0	1	0	0	0	7	0	7	0	0	0	0	0	0	1	0	1	0	0	3	22
32	0	0	0	0	5	0	0	1	0	5	0	0	0	0	0	0	0	0	1	1	0	2	16
33	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	4
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	4
41	0	0	0	0	0	0	0	5	0	2	0	0	1	0	0	0	27	1	2	1	0	9	48
42	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	1	4
51	0	0	1	0	0	0	0	15	1	264	8	0	9	0	0	1	5	2	16	9	0	34	363
52	0	0	0	0	0	0	0	1	0	5	15	0	0	0	0	0	0	0	1	1	0	2	24
53	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	5
61	0	0	0	0	0	0	0	1	0	4	0	0	6	1	0	0	3	0	2	2	0	7	26
62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	3	0	0	1	0	2	1	8
81	0	1	1	18	2	0	1	4	0	7	0	2	2	0	0	0	122	0	1	0	0	11	172
82	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
91	0	0	0	3	4	1	2	1	0	11	0	2	1	0	0	1	1	0	27	2	1	8	64
92	0	0	0	0	3	1	1	0	0	13	0	0	0	0	0	0	0	0	1	6	0	1	27
1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	5	0	8
2	0	0	1	1	0	0	0	11	0	35	1	1	5	0	0	1	10	2	9	4	0	112	192
TOTAL	1	2	3	22	16	4	4	47	4	363	24	5	26	1	0	8	172	5	64	27	8	194	9997

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 4C - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 40

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
1C	0	C	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	C	0	0	0	C	0	1	0	2	0	0	0	0	0	0	1	0	1	0	0	1	8
22	0	0	1	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
31	0	1	0	0	1	C	0	3	0	2	0	C	0	0	0	0	1	0	0	0	0	1	10
32	0	C	0	C	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3
33	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
41	0	C	0	0	0	0	0	27	1	3	0	1	1	0	0	0	51	1	1	0	1	6	93
42	0	C	0	C	0	0	0	0	3	0	0	0	0	0	0	0	2	0	1	0	0	1	8
51	0	C	0	0	0	C	0	19	1	142	1	3	9	2	0	2	14	10	4	0	5	14	226
52	0	0	0	0	0	0	0	0	0	1	4	C	0	0	0	0	0	0	0	0	0	0	7
53	0	C	0	0	0	0	0	2	1	3	0	7	3	0	0	2	4	1	1	0	1	2	25
61	0	0	0	0	0	C	0	3	0	4	0	2	20	2	0	1	5	6	0	0	3	8	54
62	0	C	0	0	0	C	0	1	0	2	0	0	1	8	0	0	1	3	0	0	0	1	18
63	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	C	0	C	0	0	0	1	0	1	0	1	1	0	0	14	1	1	1	0	2	3	27
81	0	4	0	8	0	0	0	20	1	26	0	6	4	1	0	1	158	4	3	0	5	20	262
82	0	1	0	C	0	0	0	2	0	16	0	1	8	3	0	0	2	4	0	0	1	3	41
91	0	2	0	2	1	0	1	1	0	3	C	1	1	0	0	0	1	0	10	0	1	2	26
92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1	0	C	0	0	0	0	0	3	0	5	0	1	3	0	C	4	2	2	1	0	54	1	76
2	0	C	0	0	0	0	0	9	1	14	0	2	4	1	0	1	19	7	2	0	2	48	110
TCTAL	0	8	2	10	3	C	1	92	8	225	7	25	54	18	0	26	262	40	26	1	77	112	9953

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 48 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 48

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	1	1	0	1	3	0	5	0	0	1	0	0	0	3	0	1	0	0	4	20
22	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	4
31	0	2	0	0	1	0	0	5	0	5	1	0	1	0	0	1	4	0	2	0	0	4	27
32	0	0	0	0	4	0	0	1	0	1	1	0	1	0	0	0	1	0	3	0	0	1	15
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	0	0	0	6
41	0	0	0	0	0	0	0	17	0	2	0	0	2	0	0	1	47	0	2	0	0	7	79
42	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	3	0	0	0	6
51	0	1	0	0	0	0	0	12	1	98	2	0	6	1	1	1	9	1	6	2	2	18	152
52	0	0	0	0	0	0	0	2	0	1	14	0	0	0	0	0	0	0	2	0	0	1	21
53	0	0	0	0	0	0	0	1	0	5	0	0	1	0	0	0	14	0	1	0	0	1	23
61	0	0	0	0	0	0	0	2	0	3	0	0	7	1	0	1	10	1	2	0	0	10	38
62	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	1	6
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	1	8
70	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	11	3	0	1	1	2	6	26
81	0	11	1	18	1	0	0	20	1	17	1	18	6	0	0	3	164	0	7	1	1	10	279
82	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	6
91	0	5	1	6	5	0	3	2	1	3	1	2	2	0	0	2	3	0	51	2	1	4	93
92	0	0	0	0	3	0	1	0	0	0	0	1	0	0	0	0	0	0	2	3	0	2	13
1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2	1	0	1	0	21	1	30
2	0	1	0	0	0	0	0	11	1	17	0	1	9	0	1	3	13	2	6	2	2	77	147
TOTAL	0	20	4	27	15	0	6	78	6	153	21	23	38	6	8	26	279	6	93	13	30	148	7594

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 58 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 58

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	1	1	0	0	4	1	3	0	0	2	0	0	0	2	0	2	0	0	2	19
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
31	0	1	0	0	0	0	0	9	1	4	0	0	2	0	0	0	4	0	1	0	0	3	29
32	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	7
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	3
41	0	0	0	1	0	0	0	25	0	2	0	1	2	0	0	1	53	0	1	0	0	12	100
42	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	4	0	3	0	0	1	12
51	0	0	0	0	0	0	0	15	1	126	1	1	9	1	0	1	7	1	7	1	1	15	189
52	0	0	0	0	0	0	0	0	0	1	5	0	1	0	0	0	0	0	1	0	0	0	9
53	0	0	0	0	0	0	0	2	0	2	0	2	1	0	0	0	6	0	1	0	0	1	17
61	0	0	0	0	0	0	0	3	0	3	0	1	7	1	0	1	22	1	2	0	1	11	54
62	0	0	0	0	0	0	0	1	0	1	0	0	0	7	0	0	0	1	1	0	0	3	14
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
70	0	0	0	0	0	0	0	1	0	1	0	0	2	0	0	5	0	0	1	0	1	1	13
81	0	11	0	22	0	0	0	24	3	19	0	8	8	0	0	1	176	0	3	0	0	11	290
82	0	0	0	0	0	0	0	0	0	3	0	0	2	1	0	0	0	0	0	0	0	0	8
91	0	6	0	2	2	0	2	2	1	4	1	3	3	0	0	0	0	0	56	0	1	3	87
92	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	4
1	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	1	0	14	0	19
2	0	0	0	0	0	0	0	10	1	14	1	1	12	1	0	1	14	3	3	0	1	60	123
TOTAL	0	19	1	29	7	0	3	99	12	189	9	17	53	14	1	13	290	8	87	4	19	124	14045

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 68 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 68

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	1	0	0	0	0	0	5
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
31	0	0	0	1	1	0	0	5	0	14	0	1	0	0	0	0	2	0	1	0	0	0	28
32	0	0	0	0	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	3
41	0	0	0	2	0	0	0	30	0	6	0	0	0	0	0	0	53	0	0	0	0	10	103
42	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	2	0	0	1	7
51	0	0	0	0	0	0	0	39	2	450	7	0	7	1	0	2	4	0	2	0	3	11	529
52	0	0	0	0	0	0	0	2	1	6	27	0	0	0	0	0	0	0	0	0	0	1	38
53	0	0	0	0	0	0	0	2	0	3	0	1	0	0	0	0	2	0	0	0	0	0	9
61	0	0	0	0	0	0	0	1	0	4	0	0	10	2	0	1	3	0	0	0	0	4	25
62	0	0	0	0	0	0	0	0	0	1	0	0	0	8	0	0	0	0	0	0	0	1	12
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	1	0	2	0	0	1	0	0	8	0	0	1	0	1	1	14
81	0	3	0	20	0	0	0	13	0	24	0	6	1	0	0	1	45	0	1	0	1	5	120
82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	0	1	0	3	0	0	1	1	0	1	0	1	0	0	0	0	0	0	26	0	0	1	37
92	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	1	0	0	0	0	4	0	9
2	0	0	0	1	0	0	0	6	0	12	1	0	4	1	0	1	7	0	1	0	0	20	54
TOTAL	0	5	1	28	5	0	3	103	7	528	38	9	25	12	0	14	120	0	37	1	9	55	14632

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TCTAL CELL CONTAINS GRAND TOTAL FOR FREQUENCIES (N)
TEACHER 70 - PROJECT E FOURTH GRADE - JANUARY, APRIL 1966 66A 70

CAT.	10	21	22	31	32	33	34	41	42	51	52	53	61	62	63	70	81	82	91	92	1	2	TOTAL
10	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
21	0	0	0	1	2	C	0	1	1	4	C	0	1	0	0	0	0	0	2	0	0	3	15
22	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	5
31	0	1	0	1	2	0	1	2	1	3	0	0	0	0	0	0	1	0	2	0	0	3	18
32	0	1	0	C	9	0	1	1	0	4	0	0	1	0	0	0	1	0	3	0	0	3	26
33	0	C	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5
34	0	C	0	0	0	0	1	0	0	1	C	0	0	0	0	0	4	0	4	0	0	3	15
41	0	C	0	C	0	C	0	10	0	3	C	0	0	0	0	0	16	0	3	0	0	10	45
42	0	0	0	C	0	0	0	0	6	1	0	0	0	0	0	0	1	0	3	0	0	4	15
51	0	1	0	C	2	1	0	12	2	221	10	0	6	1	1	2	13	4	22	2	2	20	320
52	0	0	0	0	0	0	0	0	0	7	8	C	0	0	0	0	0	0	1	0	0	0	19
53	0	C	0	0	0	0	C	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	4
61	0	0	0	0	0	0	0	1	0	4	0	0	5	2	0	0	1	0	3	0	2	6	26
62	0	C	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	1	0	0	1	5
63	0	0	0	0	0	C	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3
7C	0	0	0	0	0	C	0	0	0	3	0	0	1	0	0	5	0	0	1	0	2	2	14
81	0	4	0	7	2	0	2	4	1	14	0	2	1	0	0	1	36	0	4	0	1	10	89
82	0	C	0	0	0	0	0	0	0	6	0	0	1	0	0	0	0	1	1	0	0	1	13
91	0	7	1	7	5	0	4	3	1	14	0	1	2	0	0	1	0	1	77	1	4	15	146
92	0	C	0	0	1	C	0	0	0	2	C	0	0	C	0	0	0	0	1	1	0	1	6
1	0	0	0	0	0	0	0	1	0	4	0	C	2	0	0	2	1	1	2	1	38	1	54
2	0	1	0	1	2	C	2	8	3	25	0	C	5	0	0	2	12	3	15	1	2	72	156
TOTAL	1	15	5	18	26	5	15	45	15	319	19	4	26	5	3	14	89	13	145	6	54	158	8213 *

The Basic 10 x 10 Matrices for Fourth Grade Teachers:--On the next sixteen pages can be found the 10 x 10 matrices of raw frequencies for each teacher and, just below, the same matrix adjusted to 1,000 tallies. These 10 x 10 matrices display the same data as the 22 x 22 matrices (on the preceding pages) by eliminating all subscript notations.

TEACHER INTERACTION MATRIX 1 TEACHER 11, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	1.0	-.0	2.0	1.0	2.0	-.0	1.0	-.0	1.0	8.0
2	-.0	48.0	105.0	56.0	65.0	45.0	1.0	42.0	53.0	80.0	495.0
3	-.0	45.0	374.0	93.0	151.0	67.0	5.0	242.0	217.0	122.0	1316.0
4	-.0	8.0	14.0	174.0	49.0	37.0	2.0	638.0	168.0	132.0	1222.0
5	-.0	20.0	24.0	277.0	1861.0	156.0	9.0	158.0	187.0	200.0	2892.0
6	-.0	7.0	9.0	68.0	107.0	307.0	5.0	138.0	63.0	230.0	934.0
7	-.0	1.0	1.0	7.0	12.0	7.0	9.0	6.0	5.0	7.0	55.0
8	2.0	186.0	388.0	255.0	245.0	90.0	5.0	1256.0	104.0	203.0	2734.0
9	1.0	148.0	356.0	74.0	132.0	47.0	7.0	54.0	1053.0	156.0	2028.0
10	3.0	31.0	47.0	216.0	269.0	176.0	12.0	199.0	178.0	1401.0	2532.0
TOT.	6.0	495.0	1318.0	1222.0	2892.0	934.0	55.0	2734.0	2028.0	2532.0	14216.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	.1	-.0	.1	.1	.1	-.0	.1	-.0	.1	.6
2	-.0	3.4	7.4	3.9	4.6	3.2	.1	3.0	9.7	5.6	34.8
3	-.0	3.2	26.3	6.5	10.6	4.7	.4	17.0	15.3	8.6	92.6
4	-.0	.6	1.0	12.2	3.4	2.6	.1	44.9	11.8	9.3	86.0
5	-.0	1.4	1.7	19.5	130.9	11.0	.6	11.1	13.2	14.1	203.4
6	-.0	.5	.6	4.8	7.5	21.6	.4	9.7	4.4	16.2	65.7
7	-.0	.1	.1	.5	.8	.5	.6	.4	.4	.5	3.9
8	.1	13.1	27.3	17.9	17.2	6.3	.4	88.4	7.3	14.3	192.3
9	.1	10.4	25.0	5.2	9.3	3.3	.5	3.8	74.1	11.0	142.7
10	.2	2.2	3.3	15.2	18.9	12.4	.8	14.0	12.5	98.6	178.1
TOT.	.4	34.8	92.7	86.0	203.4	65.7	3.9	192.3	142.7	178.1	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 13, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	1.0	-.0	-.0	-.0	-.0	1.0	2.0
2	-.0	36.0	145.0	26.0	42.0	18.0	4.0	19.0	33.0	54.0	377.0
3	-.0	37.0	463.0	51.0	163.0	42.0	9.0	112.0	130.0	152.0	1159.0
4	-.0	6.0	10.0	125.0	33.0	14.0	6.0	248.0	54.0	122.0	618.0
5	1.0	12.0	39.0	162.0	2657.0	158.0	16.0	52.0	129.0	219.0	3445.0
6	-.0	9.0	9.0	34.0	122.0	329.0	23.0	63.0	34.0	163.0	788.0
7	-.0	-.0	5.0	10.0	14.0	20.0	44.0	7.0	4.0	60.0	164.0
8	-.0	147.0	168.0	56.0	94.0	38.0	5.0	556.0	17.0	81.0	1162.0
9	-.0	114.0	265.0	16.0	57.0	27.0	10.0	16.0	667.0	41.0	1213.0
10	1.0	16.0	55.0	138.0	262.0	142.0	47.0	89.0	145.0	1462.0	2357.0
TOT.	2.0	377.0	1159.0	618.0	3445.0	788.0	164.0	1162.0	1213.0	2357.0	11285.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	.1	-.0	-.0	-.0	-.0	.1	.2
2	-.0	3.2	12.8	2.3	3.7	1.6	.4	1.7	2.9	4.8	33.4
3	-.0	3.3	41.0	4.5	14.4	3.7	.8	9.9	11.5	13.5	102.7
4	-.0	.5	.9	11.1	2.9	1.2	.5	22.0	4.8	10.8	54.8
5	.1	1.1	3.5	14.4	235.4	14.0	1.4	4.6	11.4	19.4	305.3
6	-.0	.8	.8	3.0	10.8	29.2	2.0	5.6	3.0	14.6	69.8
7	-.0	-.0	.4	.9	1.2	1.8	3.9	.6	.4	5.3	14.5
8	-.0	13.0	14.9	5.0	8.3	3.4	.4	49.3	1.5	7.2	103.0
9	-.0	10.1	23.5	1.4	5.1	2.4	.9	1.4	59.1	3.6	107.5
10	.1	1.4	4.9	12.2	23.2	12.6	4.2	7.9	12.8	129.6	208.9
TOT.	.2	33.4	102.7	54.8	305.3	69.8	14.5	103.0	107.5	208.9	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 15, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	2.0	-.0	-.0	-.0	3.0	-.0	-.0	-.0	-.0	-.0	5.0
2	-.0	11.0	23.0	26.0	22.0	2.0	-.0	12.0	20.0	9.0	125.0
3	-.0	7.0	172.0	89.0	97.0	6.0	-.0	52.0	109.0	42.0	574.0
4	-.0	1.0	8.0	224.0	34.0	12.0	1.0	345.0	121.0	130.0	876.0
5	2.0	10.0	17.0	180.0	1727.0	87.0	1.0	37.0	80.0	129.0	2270.0
6	-.0	-.0	3.0	25.0	64.0	280.0	-.0	24.0	8.0	87.0	491.0
7	-.0	-.0	-.0	-.0	-.0	1.0	10.0	-.0	1.0	6.0	18.0
8	-.0	45.0	162.0	113.0	107.0	37.0	1.0	491.0	27.0	59.0	1042.0
9	-.0	47.0	169.0	77.0	60.0	14.0	-.0	7.0	866.0	68.0	1308.0
10	1.0	4.0	20.0	142.0	156.0	52.0	5.0	74.0	76.0	495.0	1025.0
TOT.	5.0	125.0	574.0	876.0	2270.0	491.0	18.0	1042.0	1308.0	1025.0	7734.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	.3	-.0	-.0	-.0	.4	-.0	-.0	-.0	-.0	-.0	.6
2	-.0	1.4	3.0	3.4	2.8	.3	-.0	1.6	2.6	1.2	16.2
3	-.0	.9	22.2	11.5	12.5	.8	-.0	6.7	14.1	5.4	74.2
4	-.0	.1	1.0	29.0	4.4	1.6	.1	44.6	15.6	16.8	113.3
5	.3	1.3	2.2	23.3	223.3	11.2	.1	4.8	10.3	16.7	293.5
6	-.0	-.0	.4	3.2	8.3	36.2	-.0	3.1	1.0	11.2	63.5
7	-.0	-.0	-.0	-.0	-.0	.1	1.3	-.0	.1	.8	2.3
8	-.0	5.8	20.9	14.6	13.8	4.8	.1	63.5	3.5	7.6	134.7
9	-.0	6.1	21.9	10.0	7.8	1.8	-.0	.9	112.0	8.8	169.1
10	.1	.5	2.6	18.4	20.2	6.7	.6	9.6	9.8	64.0	132.5
TOT.	.6	16.2	74.2	113.3	293.5	63.5	2.3	134.7	169.1	132.5	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 18, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	1.0	1.0
2	-.0	2.0	2.0	-.0	6.0	-.0	-.0	1.0	3.0	4.0	18.0
3	-.0	5.0	98.0	33.0	72.0	5.0	4.0	29.0	51.0	71.0	368.0
4	-.0	-.0	2.0	185.0	34.0	9.0	3.0	214.0	70.0	201.0	718.0
5	1.0	-.0	12.0	122.0	3306.0	31.0	11.0	26.0	167.0	394.0	4070.0
6	-.0	-.0	-.0	4.0	18.0	86.0	3.0	21.0	29.0	70.0	231.0
7	-.0	-.0	1.0	4.0	2.0	3.0	33.0	6.0	3.0	35.0	87.0
8	-.0	2.0	109.0	100.0	60.0	9.0	6.0	859.0	40.0	110.0	1295.0
9	-.0	7.0	116.0	58.0	157.0	21.0	7.0	8.0	606.0	158.0	1138.0
10	-.0	2.0	28.0	212.0	415.0	67.0	20.0	131.0	169.0	1467.0	2511.0
TOT.	1.0	18.0	368.0	718.0	4070.0	231.0	87.0	1295.0	1138.0	2511.0	10437.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	.1	.1
2	-.0	.2	.2	-.0	.6	-.0	-.0	.1	.3	.4	1.7
3	-.0	.5	9.4	3.2	6.9	.5	.4	2.8	4.9	6.8	35.3
4	-.0	-.0	.2	17.7	3.3	.9	.3	20.5	6.7	19.3	68.8
5	.1	-.0	1.1	11.7	316.8	3.0	1.1	2.5	16.0	37.8	390.0
6	-.0	-.0	-.0	.4	1.7	8.2	.3	2.0	2.8	6.7	22.1
7	-.0	-.0	.1	.4	.2	.3	3.2	.6	.3	3.4	8.3
8	-.0	.2	10.4	9.6	5.7	.9	.6	82.3	3.8	10.5	124.1
9	-.0	.7	11.1	5.6	15.0	2.0	.7	.8	58.1	15.1	109.0
10	-.0	.2	2.7	20.3	39.8	6.4	1.9	12.6	16.2	140.6	240.6
TOT.	.1	1.7	35.3	68.8	390.0	22.1	8.3	124.1	109.0	240.6	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 19, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	0.0	1.0	-.0	2.0	4.0	-.0	-.0	2.0	-.0	-.0	19.0
2	-.0	30.0	15.0	26.0	34.0	3.0	2.0	12.0	14.0	19.0	155.0
3	-.0	47.0	223.0	217.0	202.0	9.0	6.0	98.0	119.0	55.0	976.0
4	2.0	1.0	15.0	336.0	110.0	13.0	11.0	561.0	74.0	176.0	1299.0
5	3.0	11.0	17.0	332.0	2035.0	52.0	15.0	95.0	171.0	153.0	2884.0
6	1.0	1.0	5.0	17.0	41.0	143.0	7.0	24.0	18.0	55.0	312.0
7	1.0	-.0	1.0	13.0	9.0	4.0	81.0	6.0	8.0	37.0	160.0
8	-.0	32.0	418.0	166.0	151.0	22.0	6.0	1220.0	66.0	60.0	2141.0
9	1.0	23.0	260.0	51.0	127.0	21.0	7.0	11.0	902.0	68.0	1471.0
10	1.0	9.0	22.0	139.0	171.0	45.0	25.0	112.0	99.0	948.0	1571.0
TOT.	9.0	155.0	976.0	1299.0	2884.0	312.0	160.0	2141.0	1471.0	1571.0	10988.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	.9	.1	-.0	.2	.4	-.0	-.0	.2	-.0	-.0	1.7
2	-.0	2.7	1.4	2.4	3.1	.3	.2	1.1	1.3	1.7	14.1
3	-.0	4.3	20.3	19.7	18.4	.8	.5	8.9	10.8	5.0	88.8
4	.2	.1	1.4	30.6	10.0	1.2	1.0	51.1	6.7	16.0	118.2
5	.3	1.0	1.5	30.2	185.2	4.7	1.4	8.6	15.6	13.9	262.5
6	.1	.1	.5	1.5	3.7	13.0	.6	2.2	1.6	5.0	28.4
7	.1	-.0	.1	1.2	.8	.4	7.4	.5	.7	3.4	14.6
8	-.0	2.9	38.0	15.1	13.7	2.0	.5	111.0	6.0	5.5	194.8
9	.1	2.1	23.7	4.6	11.6	1.9	.6	1.0	82.1	62.0	133.9
10	.1	.8	2.0	12.7	15.6	4.1	2.3	10.2	9.0	86.3	143.0
TOT.	1.7	14.1	88.8	118.2	262.5	28.4	14.6	194.8	133.9	143.0	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 22, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	1.0	-.0	-.0	-.0	-.0	1.0	2.0
2	-.0	2.0	6.0	26.0	8.0	4.0	1.0	11.0	4.0	3.0	65.0
3	-.0	19.0	99.0	291.0	114.0	8.0	4.0	97.0	40.0	34.0	706.0
4	-.0	7.0	29.0	690.0	151.0	39.0	15.0	867.0	53.0	275.0	2126.0
5	-.0	1.0	11.0	363.0	1047.0	56.0	20.0	65.0	53.0	108.0	1724.0
6	-.0	3.0	4.0	47.0	41.0	213.0	9.0	26.0	17.0	97.0	457.0
7	-.0	-.0	-.0	23.0	18.0	6.0	40.0	6.0	4.0	26.0	123.0
8	-.0	21.0	469.0	403.0	153.0	28.0	9.0	518.0	52.0	64.0	1717.0
9	-.0	8.0	75.0	51.0	66.0	25.0	5.0	6.0	361.0	16.0	613.0
10	2.0	4.0	13.0	232.0	125.0	78.0	20.0	121.0	29.0	842.0	1466.0
TOT.	2.0	65.0	706.0	2126.0	1724.0	457.0	123.0	1717.0	613.0	1466.0	8999.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	.1	-.0	-.0	-.0	-.0	.1	.2
2	-.0	.2	.7	2.9	.9	.4	.1	1.2	.4	.3	7.2
3	-.0	2.1	11.0	32.3	12.7	.9	.4	10.8	4.4	3.8	78.5
4	-.0	.8	3.2	76.7	16.8	4.3	1.7	96.3	5.9	30.6	236.2
5	-.0	.1	1.2	40.3	116.3	6.2	2.2	7.2	5.9	12.0	191.6
6	-.0	.3	.4	5.2	4.6	23.7	1.0	2.9	1.9	10.8	50.8
7	-.0	-.0	-.0	2.6	2.0	.7	4.4	.7	.4	2.9	13.7
8	-.0	2.3	52.1	44.8	17.0	3.1	1.0	57.6	5.8	7.1	190.8
9	-.0	.9	8.3	5.7	7.3	2.8	.6	.7	40.1	1.8	68.1
10	.2	.4	1.4	25.8	13.9	8.7	2.2	13.4	3.2	93.6	162.9
TOT.	.2	7.2	78.5	236.2	191.6	50.8	13.7	190.8	68.1	162.9	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 24, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	2.0	1.0	-.0	1.0	-.0	1.0	1.0	2.0	8.0
2	-.0	2.0	14.0	16.0	25.0	5.0	2.0	13.0	10.0	19.0	106.0
3	2.0	5.0	76.0	74.0	86.0	19.0	3.0	43.0	67.0	71.0	446.0
4	-.0	2.0	4.0	236.0	56.0	44.0	13.0	535.0	76.0	228.0	1194.0
5	3.0	7.0	10.0	236.0	1671.0	101.0	16.0	36.0	64.0	361.0	2505.0
6	-.0	4.0	-.0	63.0	60.0	266.0	23.0	40.0	26.0	220.0	702.0
7	-.0	-.0	1.0	15.0	12.0	18.0	90.0	9.0	19.0	82.0	246.0
8	-.0	44.0	169.0	188.0	146.0	60.0	30.0	278.0	36.0	116.0	1067.0
9	2.0	29.0	144.0	55.0	47.0	27.0	19.0	4.0	488.0	85.0	900.0
10	1.0	13.0	26.0	310.0	402.0	161.0	50.0	108.0	113.0	1512.0	2696.0
TOT.	8.0	106.0	446.0	1194.0	2505.0	702.0	246.0	1067.0	900.0	2696.0	9870.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	.2	.1	-.0	.1	-.0	.1	.1	.2	.8
2	-.0	.2	1.4	1.6	2.5	.5	.2	1.3	1.0	1.9	10.7
3	.2	.5	7.7	7.5	8.7	1.9	.3	4.4	6.8	7.2	45.2
4	-.0	.2	.4	23.9	5.7	4.5	1.3	54.2	7.7	23.1	121.0
5	.3	.7	1.0	23.9	169.3	10.2	1.6	3.6	6.5	36.6	253.0
6	-.0	.4	-.0	6.4	6.1	27.0	2.3	4.1	2.6	22.3	71.1
7	-.0	-.0	.1	1.5	1.2	1.8	9.1	.9	1.9	8.3	24.9
8	-.0	4.5	17.1	19.0	14.8	6.1	3.0	28.2	3.6	11.8	108.1
9	.2	2.9	14.6	5.6	4.8	2.7	1.9	.4	49.4	8.6	91.2
10	.1	1.3	2.6	31.4	40.7	16.3	5.1	10.9	11.4	153.2	273.2
TOT.	.8	10.7	45.2	121.0	253.8	71.1	24.9	108.1	91.2	273.2	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 25, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	2.0	2.0	2.0	-.0	3.0	3.0	4.0	16.0
2	-.0	4.0	26.0	25.0	23.0	19.0	4.0	13.0	16.0	25.0	155.0
3	-.0	20.0	128.0	152.0	160.0	27.0	12.0	73.0	87.0	48.0	707.0
4	2.0	6.0	1.0	291.0	56.0	44.0	21.0	836.0	82.0	97.0	1436.0
5	5.0	6.0	2.0	381.0	2039.0	123.0	52.0	109.0	103.0	135.0	2955.0
6	1.0	4.0	2.0	60.0	74.0	544.0	42.0	124.0	54.0	224.0	1129.0
7	-.0	1.0	2.0	36.0	41.0	41.0	274.0	34.0	24.0	112.0	565.0
8	1.0	50.0	310.0	276.0	321.0	135.0	49,0	851.0	89.0	73.0	2155.0
9	3.0	55.0	226.0	73.0	73.0	38.0	26.0	21.0	676.0	32.0	1223.0
10	4.0	9.0	10.0	140.0	166.0	156.0	85.0	91.0	89.0	1318.0	2068.0
TOT.	16.0	155.0	707.0	1436.0	2955.0	1129.0	565.0	2155.0	1223.0	2068.0	12409.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	.2	.2	.2	-.0	.2	.2	.3	1.3
2	-.0	.3	2.1	2.0	1.9	1.5	.3	1.0	1.3	2.0	12.5
3	-.0	1.6	10.3	12.2	12.9	2.2	1.0	5.9	7.0	3.9	57.0
4	.2	.5	.1	23.5	4.5	3.5	1.7	67.4	6.6	7.8	115.7
5	.4	.5	.2	30.7	164.3	9.9	4.2	8.8	8.3	10.9	238.0
6	.1	.3	.2	4.8	6.0	43.8	3.4	10.0	4.4	18.1	91.0
7	-.0	.1	.2	2.9	3.3	3.3	22.1	2.7	1.9	9.0	45.5
8	.1	4.0	25.0	22.2	25.9	10.9	3.9	68.6	7.2	5.9	173.7
9	.2	4.4	18.2	5.9	5.9	3.1	2.1	1.7	54.5	2.6	98.6
10	.3	.7	.8	11.3	13.4	12.6	6.8	7.3	7.2	106.2	166.7
TOT.	1.3	12.5	57.0	115.7	238.1	91.0	45.5	173.7	98.6	166.7	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 26, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	2.0	3.0	2.0	-.0	-.0	-.0	1.0	8.0
2	2.0	19.0	93.0	84.0	63.0	41.0	-.0	9.0	18.0	51.0	380.0
3	-.0	42.0	252.0	93.0	126.0	54.0	-.0	104.0	73.1	115.0	859.1
4	1.0	3.0	12.0	167.0	61.0	47.0	-.0	316.0	65.0	301.0	973.0
5	2.0	15.0	31.0	219.0	1226.0	124.0	2.0	178.0	69.0	146.0	2012.0
6	-.0	4.0	5.0	38.0	82.0	203.0	2.0	195.0	35.0	174.0	738.0
7	-.0	-.0	-.0	-.0	-.0	5.0	6.0	-.0	-.0	5.0	16.0
8	1.0	193.0	275.0	133.0	250.0	88.0	2.0	1482.0	19.0	146.0	2589.0
9	-.0	86.0	155.0	30.0	39.0	20.0	1.0	22.0	663.0	57.0	1073.0
10	2.0	18.0	36.0	207.0	162.0	154.0	3.0	283.0	131.0	973.0	1969.0
TOT.	8.0	380.0	859.0	973.0	2012.0	738.0	16.0	2589.0	1073.1	1969.0	10517.1

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	.2	.3	.2	-.0	-.0	-.0	.1	.8
2	.2	1.8	8.8	8.0	6.0	3.9	-.0	.9	1.7	4.8	36.1
3	-.0	4.0	24.0	8.8	12.0	5.1	-.0	9.9	7.0	10.9	81.7
4	.1	.3	1.1	15.9	5.8	4.5	-.0	30.0	6.2	28.6	92.5
5	.2	1.4	2.9	20.8	116.6	11.8	.2	16.9	6.6	13.9	191.3
6	-.0	.4	.5	3.6	7.8	19.3	.2	18.5	3.3	16.5	70.2
7	-.0	-.0	-.0	-.0	-.0	.5	.6	-.0	-.0	.5	1.5
8	.1	18.4	26.1	12.6	23.8	8.4	.2	140.9	1.8	13.9	246.2
9	-.0	8.2	14.7	2.9	3.7	1.9	.1	2.1	63.0	5.4	102.0
10	.2	1.7	3.4	19.7	15.4	14.6	.3	26.9	12.5	92.5	187.2
TOT.	.8	36.1	81.7	92.5	191.3	70.2	1.5	246.2	102.0	177.7	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 32, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	1.0	-.0	1.0	2.0	-.0	1.0	5.0
2	1.0	12.0	20.0	27.0	38.0	33.0	10.0	24.0	14.0	48.0	227.0
3	1.0	20.0	105.0	86.0	97.0	45.0	27.0	80.0	103.0	84.0	648.0
4	-.0	2.0	4.0	145.0	30.0	29.0	23.0	513.0	61.0	82.0	889.0
5	-.0	3.0	14.0	235.0	1606.0	136.0	77.0	179.0	110.0	175.0	2535.0
6	-.0	1.0	5.0	53.0	70.0	361.0	59.0	222.0	63.0	222.0	1056.0
7	-.0	5.0	8.0	37.0	63.0	76.0	351.0	58.0	50.0	184.0	832.0
8	1.0	110.0	213.0	182.0	370.0	132.0	69.0	1863.0	41.0	108.0	3089.0
9	1.0	55.0	267.0	33.0	84.0	30.0	49.0	14.0	362.0	51.0	946.0
10	1.0	19.0	12.0	91.0	176.0	214.0	166.0	134.0	142.0	1937.0	2892.0
TOT.	5.0	227.0	648.0	889.0	2535.0	1056.0	832.0	3089.0	946.0	2892.0	13119.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	.1	-.0	.1	.2	-.0	.1	.4
2	.1	.9	1.5	2.1	2.9	2.5	.8	1.8	1.1	3.7	17.3
3	.1	1.5	8.0	6.6	7.4	3.4	2.1	6.1	7.9	6.4	49.4
4	-.0	.2	.3	11.1	2.3	2.2	1.8	39.1	4.6	6.3	67.8
5	-.0	.2	1.1	17.9	122.4	10.4	5.9	13.6	8.4	13.3	193.2
6	-.0	.1	.4	4.0	5.3	27.5	4.5	16.9	4.8	16.9	80.5
7	-.0	.4	.6	2.8	4.8	5.8	26.8	4.4	3.8	14.0	63.4
8	.1	8.4	16.2	13.9	28.2	10.1	5.3	142.0	3.1	8.2	235.5
9	.1	4.2	20.4	2.5	6.4	2.3	3.7	1.1	27.6	3.9	72.1
10	.1	1.4	.9	6.9	13.4	16.3	12.7	10.2	10.8	147.6	220.4
TOT.	.4	17.3	49.4	67.8	193.2	80.5	63.4	235.5	72.1	220.4	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 36, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	2.0	-.0	-.0	-.0	2.0	-.0	-.0	-.0	-.0	1.0	5.0
2	-.0	5.0	5.0	8.0	11.0	2.0	2.0	4.0	2.0	18.0	57.0
3	-.0	9.0	91.0	83.0	132.0	6.0	2.0	28.0	53.0	56.0	460.0
4	-.0	3.0	3.0	55.0	22.0	11.0	3.0	287.0	38.0	97.0	519.0
5	1.0	5.0	6.0	181.0	2927.0	94.0	12.0	66.0	259.0	373.0	3924.0
6	-.0	-.0	1.0	10.0	44.0	65.0	1.0	30.0	37.0	80.0	268.0
7	1.0	-.0	-.0	8.0	2.0	5.0	33.0	2.0	8.0	25.0	84.0
8	-.0	18.0	200.0	38.0	141.0	21.0	-.0	1229.0	14.0	112.0	1773.0
9	1.0	6.0	142.0	17.0	266.0	12.0	6.0	8.0	358.0	92.0	908.0
10	-.0	11.0	12.0	119.0	377.0	52.0	25.0	119.0	139.0	1170.0	2024.0
TOT.	5.0	57.0	460.0	519.0	3924.0	268.0	84.0	1773.0	908.0	2024.0	10022.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	.2	-.0	-.0	-.0	.2	-.0	-.0	-.0	-.0	.1	.5
2	-.0	.5	.5	.8	1.1	.2	.2	.4	.2	1.8	5.7
3	-.0	.9	9.1	8.3	13.2	.6	.2	2.8	5.3	5.6	45.9
4	-.0	.3	.3	5.5	2.2	1.1	.3	28.6	3.8	9.7	51.8
5	.1	.5	.6	18.1	292.1	9.4	1.2	6.6	25.8	37.2	391.5
6	-.0	-.0	.1	1.0	4.4	6.5	.1	3.0	3.7	8.0	26.7
7	.1	-.0	-.0	.8	.2	.5	3.3	.2	.8	2.5	8.4
8	-.0	1.8	20.0	3.8	14.1	2.1	-.0	122.6	1.4	11.2	176.9
9	.1	.6	14.2	1.7	26.5	1.2	.6	.8	35.7	9.2	90.6
10	-.0	1.1	1.2	11.9	37.6	5.2	2.5	11.9	13.9	116.7	202.0
TOT.	.5	5.7	45.9	51.8	391.5	26.7	8.4	176.9	90.6	202.0	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 40, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	1.0	-.0	-.0	-.0	-.0	-.0	-.0	1.0
2	-.0	10.0	8.0	16.0	25.0	2.0	1.0	15.0	12.0	13.0	104.0
3	-.0	11.0	16.0	29.0	29.0	3.0	-.0	23.0	15.0	19.0	145.0
4	-.0	3.0	-.0	304.0	47.0	15.0	4.0	537.0	13.0	84.0	1007.0
5	1.0	6.0	-.0	224.0	1604.0	138.0	36.0	289.0	45.0	228.0	2571.0
6	-.0	4.0	-.0	33.0	90.0	305.0	13.0	141.0	8.0	127.0	721.0
7	-.0	1.0	-.0	12.0	17.0	15.0	141.0	20.0	8.0	50.0	264.0
8	-.0	43.0	83.0	233.0	493.0	152.0	12.0	1675.0	37.0	283.0	3011.0
9	-.0	20.0	33.0	15.0	40.0	9.0	3.0	12.0	107.0	34.0	273.0
10	-.0	6.0	5.0	138.0	226.0	82.0	54.0	299.0	28.0	1042.0	1880.0
TOT.	1.0	104.0	145.0	1007.0	2571.0	721.0	264.0	3011.0	273.0	1880.0	9977.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	.1	-.0	-.0	-.0	-.0	-.0	-.0	.1
2	-.0	1.0	.8	1.8	2.5	.2	.1	1.5	1.2	1.3	10.4
3	-.0	1.1	1.6	2.9	2.9	.3	-.0	2.3	1.5	1.9	14.5
4	-.0	.3	-.0	30.5	4.7	1.5	.4	53.8	1.3	8.4	100.9
5	.1	.6	-.0	22.5	160.8	13.8	3.6	29.0	4.5	22.9	257.7
6	-.0	.4	-.0	3.3	9.0	30.6	1.3	14.1	.8	12.7	72.3
7	-.0	.1	-.0	1.2	1.7	1.5	14.1	2.0	.8	5.0	26.5
8	-.0	4.3	8.3	23.4	49.4	15.2	1.2	167.9	3.7	28.4	301.8
9	-.0	2.0	3.3	1.5	4.0	.9	.3	1.2	10.7	3.4	27.4
10	-.0	.6	.5	13.8	22.7	8.2	5.4	30.0	2.8	104.4	188.4
TOT.	.1	10.4	14.5	100.9	257.7	72.3	26.5	301.8	27.4	188.4	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 48, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	1.0	-.0	-.0	-.0	-.0	2.0	3.0
2	-.0	10.0	19.0	26.0	45.0	11.0	3.0	27.0	14.0	33.0	188.0
3	-.0	17.0	49.0	49.0	64.0	15.0	7.0	62.0	56.0	41.0	360.0
4	-.0	3.0	3.0	134.0	15.0	18.0	9.0	364.0	41.0	58.0	645.0
5	-.0	16.0	4.0	117.0	839.0	67.0	8.0	187.0	86.0	174.0	1498.0
6	-.0	1.0	-.0	21.0	27.0	129.0	12.0	90.0	20.0	97.0	397.0
7	-.0	3.0	-.0	10.0	8.0	8.0	83.0	23.0	12.0	54.0	201.0
8	1.0	87.0	144.0	161.0	294.0	55.0	26.0	1252.0	57.0	84.0	2161.0
9	2.0	40.0	134.0	28.0	51.0	16.0	14.0	25.0	441.0	52.0	803.0
10	-.0	11.0	7.0	99.0	154.0	78.0	39.0	131.0	76.0	763.0	1358.0
TOT.	3.0	188.0	360.0	645.0	1498.0	397.0	201.0	2161.0	803.0	1358.0	7614.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	.1	-.0	-.0	-.0	-.0	.3	.4
2	-.0	1.3	2.5	3.4	5.9	1.4	.4	3.5	1.8	4.3	24.7
3	-.0	2.2	6.4	6.4	8.4	2.0	.9	8.1	7.4	5.4	47.3
4	-.0	.4	.4	17.6	2.0	2.4	1.2	47.8	5.4	7.6	84.7
5	-.0	2.1	.5	15.4	110.2	8.8	1.1	24.6	11.3	22.9	196.7
6	-.0	.1	-.0	2.8	3.5	16.9	1.6	11.8	2.6	12.7	52.1
7	-.0	.4	-.0	1.3	1.1	1.1	10.9	3.0	1.6	7.1	26.4
8	.1	11.4	18.9	21.1	38.6	7.2	3.4	164.4	7.5	11.0	283.8
9	.3	5.3	17.6	3.7	6.7	2.1	1.8	3.3	57.9	6.8	105.5
10	-.0	1.4	.9	13.0	20.2	10.2	5.1	17.2	10.0	100.2	178.4
TOT.	.4	24.7	47.3	84.7	196.7	52.1	26.4	283.8	105.5	178.4	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 58, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	.0
2	-.0	9.0	31.0	70.0	48.0	24.0	1.0	35.0	35.0	37.0	290.0
3	-.0	22.0	65.0	141.0	85.0	38.0	3.0	82.0	57.0	60.0	553.0
4	-.0	3.0	21.0	408.0	50.0	34.0	16.0	800.0	58.0	183.0	1573.0
5	-.0	8.0	14.0	272.0	1948.0	161.0	28.0	201.0	144.0	250.0	3026.0
6	-.0	-.0	3.0	63.0	74.0	241.0	14.0	338.0	39.0	196.0	968.0
7	-.0	-.0	1.0	19.0	12.0	34.0	70.0	4.0	12.0	27.0	179.0
8	-.0	153.0	322.0	386.0	423.0	174.0	18.0	2487.0	57.0	170.0	4190.0
9	-.0	88.0	87.0	41.0	129.0	47.0	7.0	9.0	814.0	46.0	1268.0
10	-.0	7.0	9.0	173.0	257.0	215.0	22.0	234.0	52.0	1057.0	2026.0
TOT.	.0	290.0	553.0	1573.0	3026.0	968.0	179.0	4190.0	1268.0	2026.0	14073.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	.0
2	-.0	.6	2.2	5.0	3.4	1.7	.1	2.5	2.5	2.6	20.6
3	-.0	1.6	4.6	10.0	6.0	2.7	.2	5.8	4.1	4.3	39.3
4	-.0	.2	1.5	29.0	3.6	2.4	1.1	56.8	4.1	13.0	111.8
5	-.0	.6	1.0	19.3	138.4	11.4	2.0	14.3	10.2	17.8	215.0
6	-.0	-.0	.2	4.5	5.3	17.1	1.0	24.0	2.8	13.9	68.8
7	-.0	-.0	.1	1.4	.9	2.4	5.0	.3	.9	1.9	12.7
8	-.0	10.9	22.9	27.4	30.1	12.4	1.3	176.7	4.1	12.1	297.7
9	-.0	6.3	6.2	2.9	9.2	3.3	.5	.6	57.8	3.3	90.1
10	-.0	.5	.6	12.3	18.3	15.3	1.6	16.6	3.7	75.1	144.0
TOT.	.0	20.6	39.3	111.8	215.0	68.8	12.7	297.7	90.1	144.0	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 68, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	.0
2	-.0	1.0	16.0	24.0	40.0	-.0	-.0	8.0	4.0	2.0	95.0
3	-.0	9.0	78.0	106.0	234.0	5.0	1.0	42.0	31.0	12.0	518.0
4	-.0	4.0	30.0	465.0	101.0	9.0	1.0	801.0	33.0	160.0	1604.0
5	-.0	13.0	15.0	655.0	7223.0	112.0	37.0	91.0	45.0	223.0	8414.0
6	-.0	-.0	-.0	25.0	73.0	297.0	14.0	47.0	10.0	80.0	546.0
7	-.0	-.0	1.0	9.0	24.0	24.0	116.0	2.0	8.0	18.0	202.0
8	-.0	48.0	301.0	195.0	441.0	18.0	9.0	663.0	16.0	75.0	1766.0
9	-.0	15.0	66.0	12.0	40.0	10.0	4.0	1.0	391.0	16.0	555.0
10	-.0	5.0	11.0	113.0	238.0	71.0	20.0	111.0	17.0	357.0	943.0
TOT.	.0	95.0	518.0	1604.0	8414.0	546.0	202.0	1766.0	555.0	943.0	14643.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	-.0	.0
2	-.0	.1	1.1	1.6	2.7	-.0	-.0	.5	.3	.1	6.5
3	-.0	.6	5.3	7.2	16.0	.3	.1	2.9	2.1	.8	35.4
4	-.0	.3	2.0	31.8	6.9	.6	.1	54.7	2.3	10.9	109.5
5	-.0	.9	1.0	44.7	493.3	7.6	2.5	6.2	3.1	15.2	574.6
6	-.0	-.0	-.0	1.7	5.0	20.3	1.0	3.2	.7	5.5	37.3
7	-.0	-.0	.1	.6	1.6	1.6	7.9	.1	.5	1.2	13.8
8	-.0	3.3	20.6	13.3	30.1	1.2	.6	45.3	1.1	5.1	120.6
9	-.0	1.0	4.5	.8	2.7	.7	.3	.1	26.7	1.1	37.9
10	-.0	.3	.8	7.7	16.3	4.8	1.4	7.6	1.2	24.4	64.4
TOT.	.0	6.5	35.4	109.5	574.6	37.3	13.8	120.6	37.9	64.4	1000.0

TEACHER INTERACTION MATRIX 1 TEACHER 70, 4TH GRADE (PROJECT E, JANUARY-APRIL, 1966)

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	3.0	-.0	-.0	2.0	-.0	-.0	5.0
2	-.0	13.0	29.0	16.0	32.0	11.0	2.0	7.0	17.0	35.0	162.0
3	-.0	25.0	161.0	30.0	79.0	11.0	1.0	50.0	89.0	75.0	521.0
4	-.0	1.0	6.0	133.0	29.0	8.0	2.0	147.0	53.0	117.0	496.0
5	1.0	10.0	29.0	126.0	2034.0	63.0	15.0	142.0	208.0	192.0	2820.0
6	1.0	3.0	4.0	14.0	42.0	85.0	3.0	17.0	32.0	85.0	286.0
7	-.0	1.0	2.0	2.0	21.0	7.0	38.0	5.0	6.0	33.0	115.0
8	1.0	33.0	100.0	37.0	183.0	18.0	6.0	313.0	40.0	107.0	838.0
9	-.0	61.0	153.0	35.0	136.0	20.0	10.0	15.0	651.0	167.0	1248.0
10	2.0	15.0	37.0	103.0	261.0	63.0	38.0	140.0	152.0	935.0	1746.0
TOT.	5.0	162.0	521.0	496.0	2820.0	286.0	115.0	838.0	1248.0	1746.0	8237.0

TEACHER MATRIX BASED ON 1000 TALLIES

CATG.	1	2	3	4	5	6	7	8	9	10	TOT.
1	-.0	-.0	-.0	-.0	.4	-.0	-.0	.2	-.0	-.0	.6
2	-.0	1.6	3.5	1.9	3.9	1.3	.2	.8	2.1	4.2	19.7
3	-.0	3.0	19.5	3.6	9.6	1.3	.1	6.1	10.8	9.1	63.3
4	-.0	.1	.7	16.1	3.5	1.0	.2	17.8	6.4	14.2	60.2
5	.1	1.2	3.5	15.3	246.9	7.6	1.8	17.2	25.3	23.3	342.4
6	.1	.4	.5	1.7	5.1	10.3	.4	2.1	3.9	10.3	34.7
7	-.0	.1	.2	.2	2.5	.8	4.6	.6	.7	4.0	14.0
8	.1	4.0	12.1	4.5	22.2	2.2	.7	38.0	4.9	13.0	101.7
9	-.0	7.4	18.6	4.2	16.5	2.4	1.2	1.8	79.0	20.3	151.5
10	.2	1.8	4.5	12.5	31.7	7.6	4.6	17.0	18.5	113.5	212.0
TOT.	.6	19.7	63.3	60.2	342.4	34.7	14.0	101.7	151.5	212.0	1000.0

Dividing on First Two, Middle Six, and Last Two Days:--Some of the hypotheses of the original project are concerned with how teachers adjust their behavior from one phase of learning to another. In a ten-day unit of study, a presumption can be made that the learning activities of the first two days are the introductory phases of learning. A further presumption is that the last two days would be the terminal phases of learning. The other six days might be a mixture of continuing work, diagnosis, resetting tasks, etc.

For those who might be interested in any variation of interaction across the above three phases of learning, the following pages provide a rough breakdown of the data. A separate matrix for the first two days, middle six days, and last two days are provided for each teacher. There is also a total matrix for the first two, middle six, and last two days which is a composite of all sixteen teachers. Each matrix is expressed in terms of frequency per 1,000 tallies.

(1) First two days, sixteen teachers and one summary matrix (see pages 153-169);

(2) Middle six days, sixteen teachers and one summary matrix (see pages 170-186);

(3) Last two days, sixteen teachers and one summary matrix (see pages 187-203).

INTERACTION [illegible] - GRAND TOTAL CELL
TEACHER [illegible] INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	1
2	0	7	6	2	6	4	0	1	1	4	32
3	0	4	36	9	14	7	0	20	28	16	133
4	0	1	2	17	3	3	0	43	20	8	97
5	0	2	3	29	136	4	0	3	13	11	201
6	0	1	1	4	4	25	0	7	7	16	65
7	0	0	0	0	0	0	0	0	0	0	1
8	0	11	30	13	9	5	0	44	10	4	126
9	0	5	47	9	12	4	0	1	88	13	180
10	0	2	8	12	16	11	0	7	12	92	162
TOTAL	1	32	133	96	201	64	1	126	180	164	2250

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 13 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	3	22	3	3	1	0	2	2	3	39
3	0	4	49	9	22	4	0	10	11	8	116
4	0	1	2	13	3	2	0	26	6	15	68
5	0	0	5	20	201	15	2	10	9	20	282
6	0	0	1	4	10	26	1	5	2	15	63
7	0	0	0	1	2	1	2	0	0	5	11
8	0	18	18	4	14	2	1	56	1	7	121
9	0	13	17	2	4	1	0	0	57	1	95
10	0	1	2	12	21	12	4	12	6	135	206
TOTAL	0	39	116	67	280	64	11	120	94	209	2571

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 15 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

-----------------------------------------------------------------

CAT.      1     2     3     4     5     6     7     8     9    10   TOTAL

-----------------------------------------------------------------

 1        0     0     0     0     0     0     0     0     0     0       0

 2        0     3     2     7     3     0     0     2     2     2      20

 3        0     1    18    14    11     1     0    13    12     8      78

 4        0     0     2    48     7     2     0    60    12    30     159

 5        0     1     4    29   149    11     1     5     5    13     217

 6        0     0     0     6     5    42     0     4     1    14      70

 7        0     0     0     0     0     0     0     0     0     1       1

 8        0    10    30    25    19     6     0    88     2    16     196

 9        0     5    20     5     7     0     0     1    35     7      77

10        0     1     4    27    17     9     0    23     9    94     183

-----------------------------------------------------------------

TOTAL     0    20    78   159   217    70     1   196    77   184    1989

-----------------------------------------------------------------
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INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 18 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	1	1
2	0	0	1	0	1	0	0	0	0	1	2
3	0	1	7	4	8	1	1	3	3	7	35
4	0	0	0	17	4	1	1	18	6	26	73
5	1	0	3	15	281	4	0	2	8	38	352
6	0	0	0	0	3	3	1	1	1	11	18
7	0	0	0	1	0	1	2	0	0	4	7
8	0	0	14	3	7	0	1	26	3	9	63
9	0	1	6	6	7	2	1	0	54	20	96
10	0	0	4	26	41	8	1	14	22	239	354
TOTAL	1	2	35	72	352	19	6	63	96	355	1798

INTERACTION [illegible] - GRAND TOTAL CELL
TEACHER [illegible] - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	.TOTAL
1	3	0	0	0	1	0	0	1	0	0	5
2	0	2	2	2	5	1	0	0	2	1	15
3	0	3	26	11	19	1	1	9	16	5	91
4	1	0	1	25	13	2	1	60	3	8	114
5	0	1	2	41	165	7	4	12	23	20	275
6	0	0	0	1	5	13	1	4	1	12	38
7	0	0	0	0	1	1	10	2	1	6	22
8	0	4	30	18	26	4	0	98	5	4	190
9	0	3	29	2	19	1	0	0	35	4	94
10	0	0	1	13	19	7	4	4	8	97	155
TOTAL	5	15	91	114	274	37	22	190	94	156	2243

INTERACTION [illegible] X 1000 - GRAND TOTAL CELL
TEACHER [illegible] - [illegible] - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	1	6	2	2	0	3	0	1	14
3	0	4	17	27	6	1	1	13	2	2	72
4	0	2	7	117	12	6	2	100	7	20	272
5	0	1	2	27	29	3	1	4	7	11	82
6	0	2	0	8	3	59	1	1	6	20	101
7	0	0	0	2	1	2	4	1	1	4	14
8	0	3	42	56	12	3	1	32	3	8	159
9	0	1	4	6	8	9	1	1	29	1	58
10	0	2	1	23	9	18	3	7	4	162	227
TOTAL	0	14	72	271	82	102	13	159	58	228	1807

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER [illegible] - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	1
2	0	0	2	2	2	0	0	1	1	1	9
3	0	0	8	13	9	2	0	5	13	9	58
4	0	0	1	24	6	2	1	74	5	23	136
5	0	0	2	28	181	6	0	6	8	30	263
6	0	0	0	4	6	15	2	4	1	17	51
7	0	0	0	1	2	1	3	1	1	3	13
8	0	4	23	32	16	6	2	32	5	15	135
9	0	3	18	4	6	2	1	0	49	9	93
10	0	1	4	28	34	15	3	13	9	133	241
TOTAL	1	9	58	136	264	51	13	136	93	241	2462

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 25 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	1	0	2
2	0	0	4	4	1	2	0	1	2	4	18
3	0	3	21	15	14	2	1	8	14	8	85
4	0	0	0	21	3	4	2	46	9	10	96
5	1	1	0	22	136	13	4	1	7	14	198
6	0	1	0	5	8	70	2	3	6	21	117
7	0	0	0	3	4	2	10	1	1	8	28
8	0	4	25	10	14	5	2	9	2	5	76
9	0	7	34	3	5	3	3	0	28	3	87
10	1	2	1	12	13	14	5	6	17	221	293
TOTAL	3	18	85	95	197	117	29	76	87	293	2883

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 34 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

----------------------------------------------------------------

CAT.      1    2    3    4    5    6    7    8    9   10  TOTAL

----------------------------------------------------------------

  1       0    0    0    0    0    0    0    0    0    0      1

  2       0    1   10   12    7    5    0    2    1    6     43

  3       0    6   27   13   13    6    0   14    6   20    106

  4       0    0    2   16    8    2    0   47    6   39    122

  5       0    0    4   28   99   13    0    7    6   19    175

  6       0    1    0    3    9   27    0   10    2   23     75

  7       0    0    0    0    0    0    0    0    0    0      0

  8       0   22   43   17   18    6    0   43    2   11    163

  9       0   11   14    2    2    1    0    2   38    5     74

 10       0    3    6   29   17   15    0   38   13  119    241

----------------------------------------------------------------

TOTAL     1   43  106  121  173   76    0  163   74  242   2648

----------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 32 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	3	2	3	3	2	2	1	2	18
3	0	1	11	9	9	1	3	6	11	4	55
4	0	0	1	14	3	2	2	35	9	5	70
5	0	1	2	18	137	10	11	13	10	14	216
6	0	0	0	5	5	26	4	11	2	14	68
7	0	1	1	3	8	8	27	6	2	11	66
8	0	10	11	12	26	5	8	208	2	15	296
9	0	4	25	2	6	0	3	1	18	3	61
10	0	0	2	5	17	13	9	15	7	81	149
TOTAL	0	18	56	70	214	69	68	296	61	148	2612

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 36 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

-----------------------------------------------------------------

CAT.     1    2    3    4    5    6    7    8    9   10   TOTAL

-----------------------------------------------------------------

 1       0    0    0    0    0    0    0    0    0    0       0

 2       0    0    1    0    0    0    0    0    0    1       2

 3       0    0   11    3   14    0    0    2   11    8      49

 4       0    0    0    4    2    1    1   40    7   10      64

 5       0    0    2   29  306   10    1    2   31   36     417

 6       0    0    0    1    7   13    0    1    1    7      29

 7       0    0    0    1    1    1    1    0    0    0       3

 8       0    1   14    4   17    0    0   12    1   14      62

 9       0    1   22    5   34    1    0    0   53   11     127

10       0    1    1   15   34    4    1    7   25  161     247

-----------------------------------------------------------------

TOTAL    0    2   50   63  416   30    3   62  127  248    1948

-----------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 40 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	3	4	1	1	1	2	1	14
3	0	2	3	6	6	1	0	6	5	5	33
4	0	0	0	20	5	2	2	51	3	6	89
5	0	1	0	25	148	20	7	22	5	21	248
6	0	1	0	5	16	48	2	23	4	17	117
7	0	0	0	1	5	4	29	2	3	10	55
8	0	5	17	14	37	26	1	59	8	10	176
9	0	4	10	2	6	4	1	2	20	10	60
10	0	1	2	13	19	10	11	11	10	131	209
TOTAL	0	14	33	89	245	117	55	176	59	211	1741

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 48 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

---------------------------------------------------------------------

CAT.      1    2    3    4    5    6    7    8    9   10  TOTAL

---------------------------------------------------------------------

 1        0    0    0    0    1    0    0    0    0    1      1

 2        0    2    3    4    5    3    0    2    2    4     24

 3        0    2    4    6    3    4    0    2    6    3     30

 4        0    0    1   19    1    3    0   53    8   10     94

 5        0    2    1   18  133   14    2   26    7   25    228

 6        0    1    0    4    4   41    3   15    3   19     88

 7        0    0    0    2    1    0   13    2    1    5     23

 8        1   11   11   23   46   11    2  146    4    6    259

 9        1    6   10    5    7    2    1    1   42    5     79

10        0    1    1   12   28   11    3   13    7   99    174

---------------------------------------------------------------------

TOTAL     1   24   30   92  228   88   22  259   79  176   1888

---------------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER [illegible] - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	5	5	2	0	1	2	0	17
3	0	2	1	17	10	3	0	5	2	6	46
4	0	1	1	35	2	2	1	75	1	22	141
5	0	0	1	26	240	7	3	8	12	19	317
6	0	0	0	6	2	7	0	12	2	9	38
7	0	0	0	2	2	1	4	0	1	3	12
8	0	8	37	31	24	7	1	103	2	8	222
9	0	5	4	2	8	2	0	0	57	2	80
10	0	0	1	17	23	7	2	18	2	58	128
TOTAL	0	17	46	141	316	38	12	222	80	128	2830

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 68 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	3	4	6	0	0	1	1	0	15
3	0	1	6	6	14	0	0	5	4	1	38
4	0	1	0	21	4	1	0	58	4	7	96
5	0	1	1	48	628	4	1	2	3	5	693
6	0	0	0	1	3	11	0	1	0	1	17
7	0	0	0	0	0	0	8	0	1	0	9
8	0	8	21	11	30	0	0	14	1	1	85
9	0	4	6	0	3	0	0	0	9	0	23
10	0	1	1	5	5	0	0	4	1	7	23
TOTAL	0	15	38	96	694	16	9	85	23	23	3404

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 70 - OBSERVATIONS OF INSTRUCTION - FIRST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	6	3	4	2	0	1	4	8	29
3	0	6	24	6	10	2	0	9	17	18	91
4	0	0	0	24	4	1	0	20	12	16	78
5	0	2	5	18	227	11	1	4	14	19	301
6	0	1	0	1	6	10	1	1	4	14	40
7	0	0	0	0	2	1	3	0	1	5	13
8	0	5	17	5	7	1	1	16	5	6	62
9	0	12	31	4	9	4	0	0	84	25	171
10	0	2	9	16	31	9	6	10	28	101	213
TOTAL	0	29	91	78	300	41	13	62	170	214	2083

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
SUMMARY MATRIX OF OBSERVATIONS  FOR FIRST TWO DAYS

-----------------------------------------------------------------

CAT.      1    2    3    4    5    6    7    8    9   10   TOTAL

-----------------------------------------------------------------

 1        0    0    0    0    0    0    0    0    0    0       1

 2        0    1    4    4    4    2    0    1    1    2      20

 3        0    2   17   11   12    2    1    8   10    8      71

 4        0    0    1   26    5    2    1   51    7   16     109

 5        0    1    2   27  213    9    2    7   10   19     291

 6        0    0    0    3    6   27    1    6    3   14      61

 7        0    0    0    1    2    1    7    1    1    4      17

 8        0    8   24   17   20    5    1   61    3    8     149

 9        0    5   19    4    8    2    1    1   42    7      89

10        0    1    3   16   21   10    3   13   11  116     193

-----------------------------------------------------------------

TOTAL     1   20   71  108  290   61   17  149   88  194   37157

-----------------------------------------------------------------
```

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 11 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

--------------------------------------------------------------------

CAT.     1    2    3    4    5    6    7    8    9   10  TOTAL

--------------------------------------------------------------------

 1       0    0    0    0    0    0    0    0    0    0       1
 2       0    3    7    5    4    4    0    3    5    6      36
 3       0    3   26    7    9    5    0   16   14    8      89
 4       0    1    1   11    3    3    0   47   12   10      88
 5       0    1    2   15  113   13    0   11   12   16     182
 6       0    0    0    6    8   22    0   12    4   18      71
 7       0    0    0    1    1    1    1    1    0    1       4
 8       0   13   28   20   17    7    1   95    5   15     202
 9       0   12   23    5    8    3    1    2   70    9     134
10       0    2    3   17   18   15    1   15   12  111     193

--------------------------------------------------------------------

TOTAL    1   36   89   87  181   72    4  202  134  194    9386

--------------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 13 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	3	11	2	4	2	0	2	3	5	33
3	0	3	39	4	13	4	1	12	13	17	105
4	0	0	1	12	3	1	1	23	5	10	56
5	0	1	3	14	266	13	1	4	14	19	336
6	0	0	1	4	11	25	3	6	2	12	64
7	0	0	1	1	1	2	5	0	0	5	16
8	0	13	16	6	8	4	0	47	1	5	102
9	0	10	27	1	6	2	1	0	46	4	96
10	0	1	7	12	22	10	4	8	12	116	192
TOTAL	0	33	105	56	336	64	16	102	96	193	6449

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 15 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS
--------------------------------------------------------------------------

CAT.      1     2     3     4     5     6     7     8     9    10   TOTAL

--------------------------------------------------------------------------

 1        0     0     0     0     1     0     0     0     0     0       1
 2        0     0     4     2     3     0     0     2     3     1      16
 3        0     1    24    12    14     1     0     6    18     6      81
 4        0     0     1    20     5     1     0    37    20    13      97
 5        0     2     2    24   271    10     0     5    13    20     347
 6        0     0     0     2     8    31     0     3     1     9      54
 7        0     0     0     0     0     0     2     0     0     1       4
 8        0     5    21    10    12     4     0    66     3     3     124
 9        0     7    27    13     8     3     0     0   106     6     170
10        0     0     2    13    22     5     1     6     7    50     107
--------------------------------------------------------------------------

TOTAL     1    16    81    96   345    54     4   125   170   108    4357
--------------------------------------------------------------------------
```

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 18 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

--------------------------------------------------------------------

CAT.     1    2    3    4    5    6    7    8    9   10  TOTAL

--------------------------------------------------------------------

 1       0    0    0    0    0    0    0    0    0    0      0

 2       0    0    0    0    0    0    0    0    1    0      1

 3       0    0   13    3    8    1    0    2    7    8     41

 4       0    0    0   16    3    1    0   17   10   19     65

 5       0    0    1   11  352    3    1    0   22   36    426

 6       0    0    0    0    2   13    0    1    4    5     25

 7       0    0    0    1    0    0    4    0    1    3      9

 8       0    0    8    7    2    0    0   34    4    8     64

 9       0    0   17    7   21    2    1    0   82   16    146

10       0    0    4   20   37    5    2    9   16  131    224

--------------------------------------------------------------------

TOTAL    0    1   41   64  425   25    9   63  146  225   5020

--------------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 19 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	1	0	0	0	0	0	0	0	0	0	1
2	0	1	1	2	2	0	0	1	1	1	9
3	0	4	17	19	21	1	0	4	10	5	81
4	0	0	1	22	8	1	1	44	7	18	102
5	0	1	1	29	216	5	1	8	14	15	289
6	0	0	0	2	4	14	0	2	2	2	27
7	0	0	0	1	1	0	6	0	1	2	12
8	0	1	33	10	11	1	1	102	6	4	171
9	0	1	26	5	10	2	0	1	110	7	163
10	0	1	2	11	16	2	2	9	10	92	145
TOTAL	1	10	81	101	289	27	12	171	162	146	6667

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 22 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	3	1	0	0	1	1	0	5
3	0	2	8	36	14	1	0	9	3	4	78
4	0	1	3	63	20	5	2	101	6	33	231
5	0	0	1	45	146	8	3	8	5	14	230
6	0	0	1	5	6	15	1	3	1	10	42
7	0	0	0	3	3	0	6	1	0	3	16
8	0	2	55	44	19	3	1	49	6	7	187
9	0	1	9	5	6	2	1	1	35	2	60
10	0	0	2	27	15	8	2	15	3	77	150
TOTAL	0	5	78	231	230	42	16	187	60	151	5456

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 24 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	1
2	0	0	1	2	2	0	0	2	1	2	10
3	0	1	8	6	10	2	0	4	5	7	43
4	0	0	0	24	6	5	2	51	6	23	117
5	0	1	1	25	170	13	2	3	7	40	262
6	0	0	0	8	6	29	3	5	4	23	77
7	0	0	0	2	1	2	11	1	2	10	29
8	0	5	15	15	17	6	4	28	3	12	105
9	0	3	14	4	5	3	2	0	48	7	87
10	0	1	2	31	44	17	6	12	11	146	269
TOTAL	1	10	43	116	261	78	29	105	87	269	5936

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 25 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	1
2	0	0	2	2	2	2	1	1	1	2	13
3	0	1	8	11	15	3	1	6	5	3	53
4	0	1	0	22	6	4	2	71	5	5	117
5	0	0	0	36	189	11	4	10	10	10	270
6	0	0	0	6	6	43	4	14	4	19	98
7	0	0	0	3	3	4	26	3	2	8	49
8	0	5	27	21	28	15	4	75	8	6	189
9	0	4	15	6	7	3	2	2	42	2	83
10	0	1	0	9	14	12	7	6	4	74	128
TOTAL	1	13	53	116	270	98	49	189	82	128	6449

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 26 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

---------------------------------------------------------------

CAT.      1    2    3    4    5    6    7    8    9   10   TOTAL

---------------------------------------------------------------

 1        0    0    0    0    0    0    0    0    0    0       1
 2        0    2   10    7    5    3    0    1    2    3      33
 3        0    3   27    9   14    5    0    5    9    8      84
 4        0    0    1   18    5    6    0   25    7   25      88
 5        0    2    3   20  139   13    0   19    8   10     213
 6        0    0    1    4    9   19    0   15    4   12      64
 7        0    0    0    0    0    1    1    0    0    0       2
 8        0   18   22   10   24    5    0  161    2    9     251
 9        0    8   18    4    5    2    0    2   76    6     121
10        0    1    3   15   11   10    0   20   12   72     144

---------------------------------------------------------------

TOTAL     1   34   84   88  212   64    2  251  121  145    5971

---------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 32 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	2	3	2	0	2	2	5	17
3	0	2	9	5	7	5	2	6	8	7	51
4	0	0	0	10	1	2	2	37	4	6	62
5	0	0	1	17	112	12	4	15	7	13	180
6	0	0	0	4	6	27	5	17	6	20	86
7	0	0	1	3	4	6	29	4	5	13	63
8	0	7	17	12	29	10	4	119	4	6	209
9	0	5	21	3	7	3	4	1	36	4	84
10	0	2	1	7	13	17	13	8	12	174	247
TOTAL	0	18	51	62	181	85	63	209	84	246	7059

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 36 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	1	0	0	0	0	1	4
3	0	0	7	5	12	1	0	2	3	4	35
4	0	0	0	4	2	1	0	22	4	11	45
5	0	1	0	17	276	9	0	9	21	43	375
6	0	0	0	1	4	5	0	5	2	9	27
7	0	0	0	0	0	0	2	0	0	2	5
8	0	1	15	4	16	3	0	180	2	12	234
9	0	0	11	1	21	1	0	1	28	7	71
10	0	1	1	11	41	6	2	15	11	116	204
TOTAL	0	4	35	44	375	27	5	234	71	205	6418

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 40 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	2	2	0	0	2	1	1	10
3	0	1	2	3	3	0	0	2	1	2	13
4	0	1	0	41	7	1	0	63	1	10	123
5	0	1	0	25	179	10	2	31	5	24	277
6	0	0	0	3	6	22	1	10	0	10	52
7	0	0	0	1	1	1	5	2	0	2	12
8	0	4	8	30	51	12	1	174	3	32	315
9	0	2	2	2	5	0	0	1	11	2	25
10	0	0	0	16	23	7	2	31	1	92	173
TOTAL	0	10	13	123	277	52	11	314	25	175	5836

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 48 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

----------------------------------------------------------------

CAT.      1    2    3    4    5    6    7    8    9   10   TOTAL

----------------------------------------------------------------

 1        0    0    0    0    0    0    0    0    0    0       0
 2        0    1    3    3    7    0    0    4    2    5      26
 3        0    2    8    7   10    1    1   11    9    7      57
 4        0    0    0   20    2    2    2   48    5    7      87
 5        0    2    1   16  112    6    1   25   14   23     199
 6        0    0    0    2    3    6    1    9    2   10      34
 7        0    1    0    1    1    1   10    4    1    8      28
 8        0   12   23   22   38    6    4  158    9   13     285
 9        0    6   22    3    7    2    2    5   50    7     104
10        0    2    1   12   19   10    6   19   11  103     181

----------------------------------------------------------------

TOTAL     0   26   57   86  199   34   27  284  104  182    4873

----------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 58 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	3	5	3	2	0	3	4	3	24
3	0	1	6	7	5	3	0	6	5	5	39
4	0	0	2	28	5	3	1	47	5	10	99
5	0	1	1	17	130	13	2	14	11	17	205
6	0	0	0	4	6	17	1	30	3	13	75
7	0	0	0	1	0	2	5	0	1	1	11
8	0	11	19	24	29	14	1	185	5	13	300
9	0	9	7	2	10	5	1	1	69	4	107
10	0	1	0	10	18	15	1	15	5	75	140
TOTAL	0	24	39	99	206	74	11	300	107	141	7732

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 68 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

-----------------------------------------------------------------

CAT.     1    2    3    4    5    6    7    8    9   10  TOTAL

-----------------------------------------------------------------

 1       0    0    0    0    0    0    0    0    0    0      0
 2       0    0    0    1    1    0    0    0    0    0      3
 3       0    1    6    8   19    1    0    3    2    1     40
 4       0    0    3   32    6    1    0   54    2   10    107
 5       0    1    1   40  470    9    3    7    3   20    555
 6       0    0    0    2    6   29    1    4    1    7     51
 7       0    0    0    1    2    2   10    0    0    1     17
 8       0    1   24   14   27    1    1   40    1    4    113
 9       0    0    5    1    3    1    0    0   30    1     41
10       0    0    1    8   19    8    2    5    1   29     73

-----------------------------------------------------------------

TOTAL    0    3   40  107  554   52   17  113   41   74   7455

-----------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 70 - OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	1
2	0	1	3	2	3	1	0	1	1	4	17
3	0	2	19	4	11	1	0	6	9	7	60
4	0	0	1	15	4	1	0	18	6	16	61
5	0	1	3	16	255	7	1	17	28	22	350
6	0	0	1	2	5	11	0	2	4	6	31
7	0	0	0	0	2	1	4	1	0	3	12
8	0	4	12	5	23	3	0	34	4	20	106
9	0	6	16	5	17	1	1	2	85	18	152
10	0	2	3	13	28	6	5	24	14	115	210
TOTAL	1	17	60	61	349	32	12	106	152	211	4413

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL SUMMARY MATRIX FOR OBSERVATIONS OF INSTRUCTION - MIDDLE SIX DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	3	3	3	1	0	2	2	2	17
3	0	2	14	9	12	2	0	7	8	6	60
4	0	0	1	22	5	2	1	45	6	14	96
5	0	1	1	23	209	10	2	12	12	21	290
6	0	0	0	4	6	21	1	9	3	12	57
7	0	0	0	1	1	2	8	1	1	4	18
8	0	7	22	16	22	6	1	99	4	11	189
9	0	5	16	4	9	2	1	1	57	6	101
10	0	1	2	14	22	10	3	13	9	98	173
TOTAL	0	17	60	96	289	57	18	189	101	174	99477

INTERACTION [illegible] ILITIES X 1000 - GRAND TOTAL CELL
TEACHER 11 - [illegible] INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	9	2	6	1	0	3	2	6	31
3	0	2	21	3	13	2	0	17	8	4	71
4	0	0	0	11	4	1	1	41	4	9	71
5	0	1	2	27	196	11	2	20	18	9	285
6	0	0	2	2	9	17	0	3	5	6	45
7	0	0	0	1	2	0	2	0	1	1	6
8	0	15	22	13	24	4	0	106	13	21	218
9	0	11	14	2	11	3	0	11	77	13	143
10	0	2	2	9	21	5	0	16	15	60	129
TOTAL	0	31	71	70	286	44	6	218	144	130	2550

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 13 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

-----------------------------------------------------------------

CAT.     1    2    3    4    5    6    7    8    9   10  TOTAL

-----------------------------------------------------------------

 1       0    0    0    0    0    0    0    0    0    0      0
 2       0    8    5    0    2    2    0    1    5    6     29
 3       0    3   30    1    6    4    1    3    9   11     68
 4       0    0    1    1    1    0    0    9    3    8     22
 5       0    1    2    4   96   16    1    0    6   14    141
 6       0    4    1    0   12   56    1    3   11   31    118
 7       0    0    0    1    1    1    3    1    1    7     15
 8       0    4    2    4    2    3    0   59    4   10     90
 9       0    7   23    2    2    7    2   10  136   12    202
10       0    3    3    9   18   29    7    4   27  215    314

-----------------------------------------------------------------

TOTAL    0   29   67   22  140  119   15   90  202  315   1363

-----------------------------------------------------------------
```

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 15 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

-----------------------------------------------------------------------

CAT.      1     2     3     4     5     6     7     8     9    10  TOTAL

-----------------------------------------------------------------------

 1        0     0     0     0     0     0     0     0     0     0      0
 2        0     2     1     3     1     1     0     0     2     1     12
 3        0     1    23     7    10     0     0     1     6     1     48
 4        0     0     1    30     1     4     0    46     8    11    101
 5        0     1     2    15   182    15     0     4    11    11    240
 6        0     0     1     5    12    46     0     4     1    15     85
 7        0     0     0     0     0     0     0     0     0     0      0
 8        0     2     8    14    12     7     0    20     9     7     80
 9        0     4     8     9     8     2     0     4   246    22    303
10        0     1     3    18    14     9     0     1    20    66    132

-----------------------------------------------------------------------

TOTAL     0    12    48    99   240    83     0    80   303   135   1368

-----------------------------------------------------------------------
```

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 18 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

------------------------------------------------------------------

CAT.     1    2    3    4    5    6    7    8    9   10   TOTAL

------------------------------------------------------------------

 1       0    0    0    0    0    0    0    0    0    0       0
 2       0    1    0    0    1    0    0    0    0    1       3
 3       0    1    6    3    5    0    0    4    3    5      27
 4       0    0    0   20    3    1    0   27    3   17      73
 5       0    0    1   11  287    3    1    6   12   40     361
 6       0    0    0    1    1    4    0    4    3    7      20
 7       0    0    0    0    0    0    3    1    0    4       8
 8       0    0   13   16   10    2    1  179    3   15     240
 9       0    1    6    4   11    1    0    2   27   12      64
10       0    0    1   17   41    8    2   16   13  105     204

------------------------------------------------------------------

TOTAL    0    3   27   72  360   20    8  239   64  207    3598

------------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 19 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	7	2	5	5	0	0	2	1	5	28
3	0	5	25	33	9	1	1	25	8	5	112
4	0	0	4	64	12	1	1	66	9	19	177
5	0	2	1	24	110	1	0	8	12	5	164
6	0	0	1	1	1	9	1	1	0	6	22
7	0	0	0	1	0	0	9	0	0	4	16
8	0	8	62	27	10	1	1	156	5	10	280
9	0	3	12	7	9	1	1	1	44	6	86
10	0	1	3	13	9	5	1	19	5	57	116
TOTAL	0	28	112	176	165	21	16	278	86	118	2055

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 22 - LAST WEEKS OF INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	2	1	0	1	0	1	1	0	5
3	0	1	15	26	16	0	0	15	10	5	87
4	0	0	1	80	13	2	1	79	6	35	217
5	0	0	2	39	114	4	2	7	9	8	185
6	0	0	0	2	2	15	1	3	1	3	27
7	0	0	0	1	1	1	1	1	0	1	5
8	0	3	54	35	16	2	0	113	7	5	236
9	0	1	12	9	10	0	1	1	69	2	106
10	0	0	1	23	12	1	1	16	3	74	132
TOTAL	0	5	87	217	184	26	5	236	106	133	1722

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 24 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

---------------------------------------------------------------------

CAT.       1    2    3    4    5    6    7    8    9   10   TOTAL

---------------------------------------------------------------------

 1         0    0    0    0    0    0    0    0    0    1       1
 2         0    0    1    1    3    2    1    1    1    5      15
 3         0    1    6    7    3    1    1    7    3    7      35
 4         0    1    0   25    3    5    1   35   19   24     112
 5         0    2    0   13  148    6    1    2    1   35     209
 6         0    2    0    5    4   37    1    3    1   23      77
 7         0    0    0    0    0    2   10    1    4   10      27
 8         0    2   16   13    6    5    1   21    4    6      75
 9         0    3   10   16    3    2    3    1   56   14     109
10         1    3    2   31   37   19    6    6   19  217     340

---------------------------------------------------------------------

TOTAL      1   14   35  111  208   78   27   75  109  342    1449

=====================================================================
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 25 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

--------------------------------------------------------------------------

CAT.     1     2     3     4     5     6     7     8     9    10   TOTAL

--------------------------------------------------------------------------

 1       0     0     0     0     0     0     0     0     0     0       0
 2       0     0     0     1     3     1     0     1     0     1       7
 3       0     1     5    13     8     0     1     4     5     2      38
 4       0     0     0    28     3     2     2    80     7    12     133
 5       0     1     0    29   141     5     6    13     6    10     212
 6       0     0     0     2     4    21     3     8     3    13      53
 7       0     0     0     3     4     2    26     5     2    12      53
 8       0     3    22    35    33     8     5   111    11     7     235
 9       0     2    10     9     5     3     1     3   107     4     143
10       0     0     1    13    12    10     9    11     4    65     125

--------------------------------------------------------------------------

TOTAL    0     7    38   133   212    52    53   235   143   126    3054

--------------------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 26 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	1	1	0	0	0	0	0	1
2	0	4	5	5	6	5	0	0	1	7	31
3	0	4	10	2	5	4	0	7	2	7	39
4	0	0	0	10	5	2	0	21	2	24	63
5	0	3	3	12	70	8	1	24	3	19	142
6	0	1	1	2	4	8	0	41	4	20	79
7	0	0	0	0	0	1	1	0	0	2	3
8	1	14	14	13	30	22	1	207	2	31	334
9	0	4	6	0	4	3	0	2	54	6	78
10	1	3	2	19	17	27	1	32	12	115	229
TOTAL	1	31	39	63	140	79	3	334	79	230	1971

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 32 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	1	1	3	3	3	1	2	0	2	16
3	0	1	3	8	7	3	1	7	4	7	41
4	0	1	0	11	4	2	2	48	3	7	78
5	0	0	0	19	134	8	6	12	10	15	203
6	0	0	1	4	5	29	3	21	4	14	80
7	0	0	0	3	5	3	23	5	3	18	60
8	0	10	19	19	29	13	6	139	2	8	245
9	0	3	16	2	6	2	4	1	17	5	55
10	0	0	1	8	12	16	15	10	12	147	222
TOTAL	0	16	42	78	203	80	60	245	55	222	3430

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 26 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

--------------------------------------------------------------------

CAT.      1    2    3    4    5    6    7    8    9   10   TOTAL

--------------------------------------------------------------------

 1        1    0    0    0    1    0    0    0    0    1       2
 2        0    1    2    4    1    0    1    2    1    7      18
 3        0    5   16   26   15    0    1    8    7    7      84
 4        0    1    0   13    1    1    1   41    1    6      65
 5        0    1    1   10  343   12    5    2   41   17     432
 6        0    0    0    0    2    2    0    0   13    4      22
 7        1    0    0    2    0    2   13    1    4    7      29
 8        0    6   46    3    2    0    0   29    1    3      90
 9        1    2   18    0   39    2    3    1   47   13     126
10        0    2    1    6   26    3    5    6   11   70     131

--------------------------------------------------------------------

TOTAL     2   18   84   64  432   22   29   90  126  134    1531

--------------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 40 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	2	0	0	2	0	0	2	1	3	10
3	0	1	0	1	2	0	0	1	0	0	5
4	0	0	0	13	0	2	0	35	0	6	56
5	0	0	0	15	128	20	4	31	2	21	220
6	0	1	0	3	11	40	3	17	0	16	89
7	0	0	0	1	1	2	26	3	0	10	43
8	0	5	3	15	55	16	1	235	1	34	364
9	0	0	0	0	0	0	0	2	4	2	10
10	0	1	0	8	21	9	8	39	1	117	205
TOTAL	0	10	5	55	219	88	42	364	10	207	2376

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 48 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	1	1
2	0	2	1	4	0	5	1	2	2	2	20
3	0	1	5	4	10	2	2	5	0	2	31
4	0	1	0	2	6	2	1	32	1	7	54
5	0	4	0	7	52	14	1	17	7	12	114
6	0	0	0	2	5	25	0	22	5	18	77
7	0	0	0	2	0	2	10	2	5	6	28
8	0	10	16	14	28	7	6	246	6	10	342
9	1	1	10	4	2	4	1	1	140	12	176
10	0	1	0	12	12	12	5	14	10	90	156
TOTAL	1	20	31	52	114	74	28	342	176	161	833

```
INTERACTION ANALYSIS - PROBABILITIES X 1000  -  GRAND TOTAL CELL
TEACHER 58 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

----------------------------------------------------------------------

CAT.      1    2    3    4    5    6    7    8    9   10   TOTAL

----------------------------------------------------------------------

 1        0    0    0    0    0    0    0    0    0    0       0
 2        0    0    1    5    3    2    0    4    1    5      21
 3        0    1    4   10    5    1    0    5    5    1      33
 4        0    0    2   27    1    1    1   64    6    9     112
 5        0    0    1   18   63   11    2   22    9   12     138
 6        0    0    0    3    5   21    0   27    2   16      74
 7        0    0    0    2    1    3    4    0    0    3      13
 8        0   15   16   34   43   16    1  289    5   13     432
 9        0    3    8    6    9    1    1    0   43    2      74
10        0    0    0    7    9   18    3   20    1   46     105

----------------------------------------------------------------------

TOTAL     0   21   33  111  138   74   13  432   74  106    2376

----------------------------------------------------------------------
```

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 68 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	1	1	3	0	0	1	0	0	6
3	0	1	3	7	12	0	0	1	1	1	25
4	0	0	2	43	11	1	0	55	2	17	132
5	0	1	1	54	428	8	3	8	3	15	520
6	0	0	0	2	4	9	0	3	1	4	22
7	0	0	0	1	1	1	1	0	1	1	6
8	0	4	15	15	38	2	1	87	1	12	173
9	0	0	3	1	2	0	0	0	30	2	39
10	0	1	1	8	21	2	1	17	1	23	75
TOTAL	0	6	25	132	520	22	6	174	39	75	3614

INTERACTION ANALYSIS - PROBABILITIES X 1000 - GRAND TOTAL CELL
TEACHER 70 - OBSERVATIONS OF INSTRUCTION - LAST TWO DAYS

CAT.	1	2	3	4	5	6	7	8	9	10	TOTAL
1	0	0	0	0	0	0	0	0	0	0	0
2	0	3	1	1	6	1	1	1	2	2	18
3	0	2	7	1	5	2	0	2	8	4	31
4	0	0	1	9	2	1	0	18	2	7	40
5	0	2	2	14	279	5	4	41	41	32	420
6	0	0	0	2	4	5	0	3	2	5	21
7	0	1	0	1	3	1	3	1	1	3	13
8	0	4	8	4	49	1	2	95	7	4	173
9	0	5	11	4	32	4	2	4	48	19	129
10	0	1	2	5	38	4	2	7	16	81	156
TOTAL	0	17	31	40	419	22	13	171	129	157	1302

```
INTERACTION [illegible] - PROBABILITIES X 1CCC  -  GRAND TCTAL CELL
SUMMARY [illegible] INSTRUCTION LAST TWC DAYS
-----------------------------------------------------------------------
CAT.      1    2    3    4    5    6    7    8    9   10   TOTAL
-----------------------------------------------------------------------
 1        C    C    0    0    0    0    C    C    C    0       0
 2        0    2    2    2    3    1    0    1    1    3      16
 3        C    2   10    9    8    1    C    7    5    4      46
 4        0    0    1   25    5    2    1   46    5   14      98
 5        C    1    1   22  189    9    3   13   11   18     265
 6        C    C    C    2    5   20    1   1C    3   11      53
 7        0    0    0    1    1    1    9    1    1    6      22
 8        0    7   21   18   26    7    2  136    5   13     234
 9        0    3   10    4    9    2    1    2   6C    8      99
1C        C    1    1   12   20   10    4   16    9   91     167
-----------------------------------------------------------------------
TOTAL     0   15   46   97  265   53   22  234   99  168   34692
-----------------------------------------------------------------------
```

Part III

SIXTH GRADE

The sixth grade sample is discussed in Volume I of this report. There were 30 self-contained classes which were observed. These classes were selected so as to be representative of 101 classes in terms of average class scores on a pupil attitude inventory. Some features of these teachers and other measures can be found in the section which follows this introduction. The next section presents the normative interaction data. There is no section describing the category system used because the standard ten categories of the Flanders system were employed without subscripts.

Characteristics of the Teachers and Pupils.

In Table III-1 (page 205) certain features of the 30 teachers who participated by being observed are compared with the remainder of the 101 teachers who did not participate in the observation phase of the project. In general, the two groups of teachers are reasonably similar. Additional data concerning sex, marital status, and age are shown in Table III-2 (page 206). Features of the classes are presented in Table III-3 (page 206). These data will help to describe the kind of teachers whose classrooms were observed.

TABLE III-1

PERCENTAGE OF PROFESSIONAL AND EDUCATIONAL EXPERIENCE
OF THE PARTICIPATING AND NON-PARTICIPATING TEACHERS

	Pre-Credential Education			Post-Credential Education		
		Participants N = 30	Non-Participants N = 71		Participants N = 30	Non-Participants N = 71
Education Major	Elementary Certificate	73.4	63.0	Attended College Courses Recently	53.3	56.4
	Secondary Certificate	0.0	16.1			
	Professional Courses Before Degree	13.3	9.6	Attended Non-required College Courses Recently	43.3	41.4
Non-Education Major	Professional Courses After Degree	13.3	11.3	Volunteered for Inservice Training	65.5	56.6
Level of Preparation				Years of Professional Experience		
Less than B.A.		0.0	3.6	1 or less	20.0	13.8
B.A.		33.3	28.2	2-5	29.9	19.8
B.A. + 10 sem. hrs.		20.1	22.2	6-9	9.9	26.4
B.A. + 20 sem. hrs.		10.0	6.5	10-19	20.0	25.8
B.A. + 30 sem. hrs.		33.3	27.0	20-29	16.9	10.2
M.A. + 15 sem. hrs.		3.3	9.5	More than 30	3.3	5.4
M.A. + 30 sem. hrs.		0.0	2.4			
Ed.S. or more		0.0	0.6			

TABLE III-2

DEMOGRAPHIC DATA ON PARTICIPATING AND NON-PARTICIPATING TEACHERS REPORTED IN PERCENTAGES

Teachers	Marital Status		Sex		Age				
	Married	Single	Male	Female	20-24	25-29	30-34	35-44	Over 44
Participating Teachers	77.0	23.0	20.0	80.0	16.7	6.7	13.3	23.3	40.0
Non-Participating Teachers	82.0	18.0	25.6	74.4	15.0	15.0	18.6	24.6	26.8

TABLE III-3

CLASSROOM CHARACTERISTICS OF PARTICIPATING AND NON-PARTICIPATING TEACHERS REPORTED IN PERCENTAGES*

Teachers	Median Class Size*	Class Grouping		Ability Level		
		Heterogeneous	Ability	Above Average	Average	Below Average
Participating Teachers	30	85.3	14.7	33.3	50.0	16.7
Non-Participating Teachers	29	88.2	11.8	27.1	56.6	16.3

*Median class sizes are reported in whole numbers.

A total of 910 students participated, at one point or another, in this study; however, because of absentees, transients, and incomplete information, the N reported in much that follows falls short of this figure.

The majority of the students in the 30 classrooms were 11 years of age, although the ages ranged from 9 to over 13 (see Figure III.1). There were 432 girls and 384 boys.

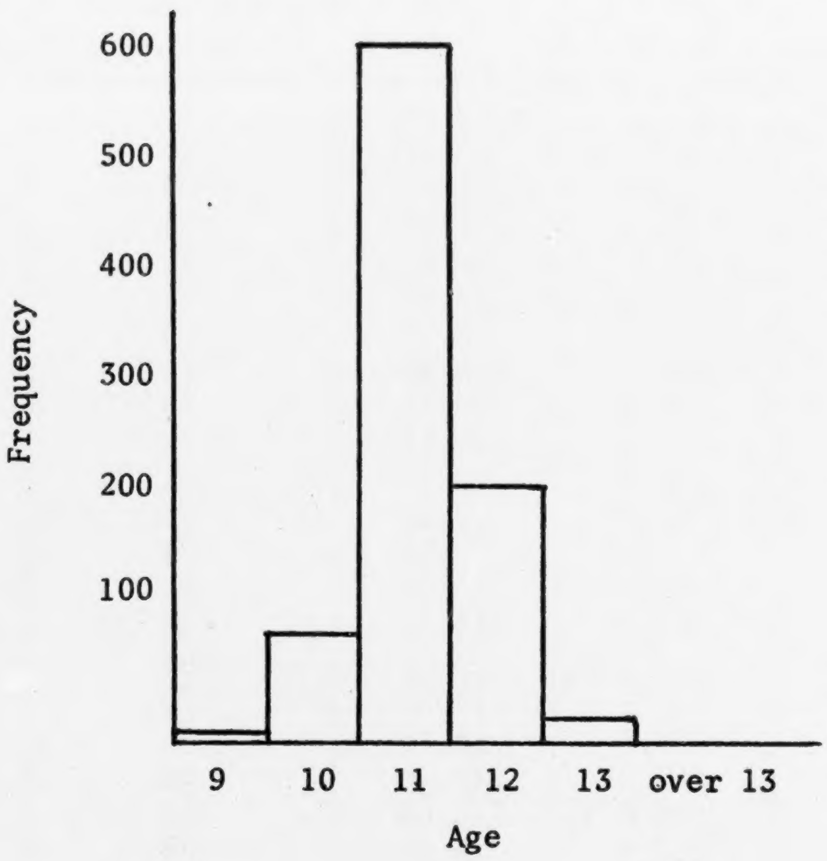

Figure III-1 Age Distribution of Pupils.

The teacher's estimate of the student's socio-economic group showed a fairly normal distribution with the majority of the cases falling in the middle class. When the teacher's report of the father's occupation was converted into NORC scores, a trimodal distribution was formed with approximately equal concentration in the factory worker, white collar worker, and professional occupations.

The average I.Q. was 108.69 with a standard deviation of 15.99; it is based on 29 classes since these data were missing for one class. The intelligence quotient and socio-economic group data for the 30 teachers are summarized in Table III-4.

TABLE III-4

I.Q. AND SOCIO-ECONOMIC STATUS DATA FOR 30 CLASSROOMS

Class Number	I.Q. Mean	I.Q. S.D.	NORC Score Median
00	111.7	12.98	71
08	112.7	10.22	70
12	121.6	12.70	81
13	125.3	10.55	83
15	116.0	8.51	83
19	104.2	13.89	67
24	106.2	15.26	69
26	102.6	15.52	71
27	116.8	10.53	78
28	113.1	11.46	70
30	112.4	14.38	66
34	97.7	9.42	57
37	120.7	7.25	71
40	106.7	13.37	69
42	97.4	15.18	55
48	116.1	12.37	83
50	113.3	14.06	75
51	109.8	13.76	74
53	100.0	20.74	63
54	99.8	16.63	59
64	114.1	13.43	78
72	82.3	9.56	49
73	83.8	10.48	49
75	110.3	13.50	67
77	105.4	13.96	55
80	104.7	15.13	61
84	---	---	54
89	118.1	12.04	65
91	104.1	11.46	69
95	118.5	19.44	67

Achievement and Pupil Attitude.

The data on pupil achievement are shown in Table III-5 (page 210). The nature of these tests and how they were administered is discussed in Volume I of this report. The scores were adjusted through analysis of covariance.

The means and standard deviations of the pupil attitude inventory are shown in Table III-6 (page 212) for each class. There were three administrations of the test during the school year.

TABLE III-5

PRE-TEST, CHANGE AND ADJUSTED CHANGE MEANS FOR 30 TEACHERS

Class Number	Usage			Parts of Speech			Punct. and Cap.			Total Language		
	Pre-Test	Change	Adjusted Change	Pre-Test	Change	Adjusted Change	Pre-Test	Change	Adjusted Change	Pre-Test	Change	Adjusted Change
00	49.36	3.43	3.27	51.89	1.32	2.65	50.07	1.18	1.81	50.32	2.32	2.68
08	45.25	5.20	3.92	47.68	10.00	8.24	54.36	-0.36	1.90	52.20	4.44	5.24
12	56.29	6.79	8.51	49.58	6.58	6.88	54.08	2.17	4.32	55.46	5.00	6.58
13	56.75	4.67	6.52	51.92	-2.00	-0.66	54.63	3.79	6.15	55.79	3.38	5.04
15	52.35	4.81	5.46	51.00	9.42	12.45	49.12	4.81	5.08	50.62	6.42	6.85
19	47.10	4.83	4.05	57.70	2.90	6.81	46.23	2.50	1.67	48.77	4.00	3.99
24	51.07	1.50	1.80	58.61	4.18	8.49	52.79	1.71	3.37	54.18	2.07	3.35
26	49.30	3.74	3.56	42.22	7.41	4.44	42.70	6.89	4.72	43.11	7.37	6.11
27	48.64	2.56	1.23	40.12	8.00	4.10	46.04	4.16	3.26	45.00	5.76	4.85
28	50.19	0.97	1.03	46.58	0.07	-0.96	49.19	4.29	4.58	49.52	2.71	2.88
30	49.19	4.00	3.79	47.81	1.58	1.10	49.52	4.50	4.88	48.62	4.89	4.84
34	48.96	2.22	1.95	52.65	5.09	6.76	48.09	0.78	0.65	49.09	3.13	3.19
37	56.36	1.42	3.16	52.77	4.00	5.72	51.36	2.94	4.06	54.10	3.10	4.36
40	47.59	7.55	6.91	46.35	4.17	3.04	49.28	2.72	3.05	47.45	6.41	6.08
42	44.94	3.66	2.29	39.88	3.66	-0.34	38.53	4.63	0.87	38.51	5.09	2.59
48	57.76	3.28	5.40	49.24	1.52	1.67	54.69	1.31	3.69	55.52	2.28	3.87
50	56.48	3.15	4.92	56.52	-2.19	1.19	52.67	3.89	5.51	56.00	2.33	4.04
51	53.17	1.56	2.43	50.65	0.59	1.37	52.00	1.83	3.19	52.50	1.83	2.71
53	46.77	-0.29	-1.16	43.94	0.82	-1.38	43.47	1.94	0.06	43.77	1.24	0.04
54	50.65	-0.18	0.01	44.56	-1.75	-3.68	53.44	-1.69	0.22	50.69	-0.88	-0.43
64	52.41	4.07	4.74	48.01	3.30	2.90	55.74	-1.19	1.59	53.63	1.85	2.99
72	36.06	2.61	-1.17	39.83	5.00	0.97	36.33	-2.00	-6.59	33.83	0.56	-3.01
73	34.52	-0.57	-4.77	49.04	-6.91	-6.85	33.13	0.22	-5.59	32.74	0.35	-3.48
75	51.28	-0.56	-0.20	47.50	1.17	0.55	43.94	7.56	5.86	45.72	5.00	4.26
77	52.12	2.92	3.51	54.07	5.15	7.45	44.93	8.63	7.30	49.07	6.41	6.47
80	46.29	2.61	1.61	40.04	9.64	5.71	44.82	1.29	-0.08	43.71	3.86	2.64
84	46.60	4.40	3.49	55.07	3.03	5.77	46.07	2.67	1.78	47.90	4.00	3.78
89	53.22	2.96	3.85	52.70	7.44	9.13	52.87	2.96	4.65	53.52	4.30	5.42
91	48.23	1.62	-0.11	43.69	4.85	2.54	48.00	4.12	3.96	47.36	4.04	3.69
95	50.32	1.14	1.24	48.93	1.86	1.87	51.46	-2.89	-1.73	50.61	-0.39	0.04

TABLE III-5 (continued)

Class Number	Language Study Skills			Social Studies Skills			Computation			Problem Solving		
	Pre-Test	Change	Adjusted Change	Pre-Test	Change	Adjusted Change	Pre-Test	Change	Adjusted Change	Pre-Test	Change	Adjusted Change
00	50.89	5.18	5.14	50.38	3.17	3.67	54.25	5.25	5.69	54.38	-0.17	0.49
08	55.28	5.80	6.89	56.33	3.74	7.02	50.08	12.88	12.80	56.12	3.64	4.59
12	55.50	4.29	5.44	56.00	2.00	5.13	55.20	13.20	13.75	56.88	2.76	3.84
13	60.38	6.25	8.66	61.08	3.96	9.46	58.13	11.78	12.70	58.30	5.44	6.76
15	54.35	6.23	7.08	52.00	7.46	8.72	54.11	5.30	5.77	53.65	4.15	4.69
19	48.50	8.00	7.34	46.70	7.73	6.53	48.17	3.14	2.83	47.86	3.31	2.88
24	52.93	5.32	5.81	50.11	6.75	7.13	55.57	5.79	6.39	51.75	5.46	5.68
26	50.44	5.26	5.11	47.59	3.63	2.83	46.52	3.56	3.05	47.41	2.33	1.83
27	52.16	7.60	7.89	51.73	4.23	5.36	48.36	8.44	8.15	50.00	4.58	4.51
28	56.16	4.74	6.06	52.58	6.90	8.43	51.29	3.81	3.88	52.90	4.13	4.54
30	52.73	7.77	8.21	48.27	9.77	9.29	48.04	7.50	7.17	47.50	4.86	4.37
34	48.74	2.26	1.67	45.78	-0.61	-2.25	46.44	3.87	3.35	47.04	4.52	3.96
37	56.33	7.40	8.76	54.00	4.47	6.66	54.23	7.47	7.91	53.23	6.23	6.70
40	49.00	4.20	3.67	51.21	6.14	7.03	56.82	3.85	4.60	52.71	5.64	6.02
42	40.66	9.28	6.60	44.00	0.50	-1.98	48.03	1.56	1.23	45.03	2.46	1.56
48	59.03	4.28	6.34	57.00	4.32	7.92	55.48	6.52	7.11	55.38	4.93	5.76
50	58.67	4.19	6.16	52.89	5.46	7.14	55.70	6.67	7.29	54.33	3.70	4.35
51	57.39	1.39	3.03	52.74	5.70	7.31	53.10	5.14	5.44	54.96	2.22	2.98
53	45.71	4.35	2.97	44.00	-1.10	-3.58	44.19	0.44	-0.36	44.72	3.78	2.83
54	49.56	5.56	5.18	42.25	3.70	0.41	42.24	4.18	3.14	44.85	1.50	0.57
64	55.11	7.00	8.05	56.54	1.61	4.99	58.90	8.52	9.53	60.36	3.50	5.16
72	34.61	-1.22	-5.46	33.18	-0.18	-7.71	36.11	0.68	-1.11	37.44	0.18	-1.99
73	34.27	0.64	-3.69	35.04	-1.39	-8.05	33.91	0.68	-1.38	37.13	-2.78	-5.00
75	50.44	3.11	2.96	45.35	2.77	0.93	52.65	-2.20	-1.96	51.53	0.94	1.13
77	47.85	4.52	3.70	48.36	1.64	1.20	49.61	1.96	1.83	47.68	2.73	2.27
80	43.57	3.96	2.03	42.29	6.04	2.77	48.04	5.48	5.15	45.68	2.76	1.97
84	48.74	3.13	2.54	47.48	5.29	4.44	49.74	10.29	10.17	47.87	3.68	3.25
89	54.00	5.35	6.11	52.59	3.96	5.50	52.74	5.22	5.47	54.00	1.77	2.37
91	51.00	1.00	0.99	47.46	5.92	5.06	49.56	5.48	5.34	49.42	2.19	2.02
95	51.11	3.43	3.45	44.07	2.87	0.43	50.86	6.82	6.84	50.80	0.93	0.99

TABLE III-6

MEANS AND STANDARD DEVIATIONS ON THE MICHIGAN STUDENT QUESTIONNAIRE

Teacher Number	First Administration			Second Administration			Third Administration		
	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N
54	204.92	19.52	25	194.67	29.65	24	194.17	25.93	23
50	201.43	12.02	30	199.97	16.06	29	195.40	15.83	30
89	200.25	24.58	24	204.91	19.53	22	200.04	19.10	24
80	199.62	16.22	29	194.71	24.18	31	192.33	23.49	30
28	197.52	13.93	31	195.22	19.00	32	195.19	21.31	32
30	197.00	17.92	29	193.52	20.75	29	189.90	24.15	30
24	193.64	19.39	28	190.55	24.01	29	187.90	26.26	29
27	192.04	25.94	25	185.71	26.24	28	175.93	27.25	27
13	191.57	24.43	23	178.92	31.08	26	186.54	20.63	26
08	190.28	19.71	25	178.29	22.41	28	176.34	29.18	29
12	180.88	16.34	24	163.71	26.83	24	156.32	29.92	25
53	179.17	17.18	23	180.33	25.87	24	176.21	24.66	24
15	178.84	14.03	25	173.34	17.44	29	164.52	18.94	27
00	176.84	17.21	31	171.35	26.62	26	155.73	30.80	30
95	175.23	14.99	30	151.87	25.47	31	155.72	19.09	32
37	178.77	27.71	31	178.00	36.58	31	176.06	33.41	32
64	177.86	24.18	28	185.38	25.34	29	178.21	22.40	28
26	176.19	26.04	27	166.61	32.57	28	169.28	39.30	29
40	175.39	27.08	28	169.21	21.07	29	167.03	23.57	31
42	173.83	29.76	36	170.21	28.72	33	166.49	26.63	35
72	166.40	14.23	25	173.05	23.43	20	174.95	18.46	19
75	166.15	32.49	20	147.65	30.61	20	150.37	27.38	19
19	165.10	24.15	29	151.30	28.35	30	143.83	26.60	29
77	162.74	28.94	31	174.69	31.29	26	173.93	26.24	29
91	162.71	19.67	31	159.79	24.26	29	160.77	21.67	26
84	158.13	24.72	31	149.43	28.72	30	147.20	25.30	25
48	158.06	19.06	31	153.97	23.08	30	161.16	24.28	32
51	157.15	26.79	27	145.50	25.88	24	139.23	33.89	26
73	156.57	20.74	21	137.33	16.27	24	147.70	21.88	20
34	149.91	20.67	22	137.17	21.68	24	142.23	28.30	22

Interaction Analysis Data for the Sixth Grade.

The interaction analysis data for the sixth grade consists of separate matrices for each of the 30 teachers who were observed. For each teacher there is a matrix for language arts only, social studies only, mathematics only, and the total composite matrix. The reason that a composite matrix is not the sum of the matrices which precede it is that certain other time-use segments have been left out of the composite. For example, nearly all teachers were observed during periods of administrative routine, and most, but not all of the teachers, were observed during the teaching of science.

```
 INTERACTION ANALYSIS

TEACHER NUMBER=00   LANGUAGE ARTS

-----------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10     SUM


-----------------------------------------------------------------
  1        0    0    0    0    0    0    0    0    0    0       0

  2        0    0    1    2    1    3    0    1    1    1      10

  3        0    2   19   18   23   13    0   13   23    7     118

  4        0    0    0   25    5    4    0   64    6    5     109

  5        0    0    2   19  342   17    0   27   29   88     524

  6        0    0    0    4   20   29    1    7    2   23      86

  7        0    0    1    0    2    0    7    0    2    1      13

  8        0    7   44   31   37    4    0  466    1    4     594

  9        0    1   50    5   18    1    1    1   49    3     129

 10        0    0    1    5   76   16    4   15   16  234     367


-----------------------------------------------------------------
TOTAL      0   10  118  109  524   86   13  594  129  367    1950

PERCENT   .0   .5  6.1  5.6 26.9  4.4   .7 30.5  6.6 18.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1     2     3     4     5     6     7
               ---------------------------------------
                .0   1.2  13.7  12.7  60.9  10.0   1.5

    PERCENT TEACHER TALK  54.33       PERCENT STEADY STATE  60.05

         PERCENT CONTENT  32.46,              TOTAL I/I+D  27.56

          REVISED I/I+D  56.39                ROW 8 I/I+D  92.73

      ROW 8 - 9 I/I+D  69.35                  ROW 9 I/I+D  96.23

 THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=00   SOCIAL STUDIES

---------------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10     SUM

---------------------------------------------------------------------------
  1         0     0     0     0     1     0     0     0     0     0       1

  2         0     0     0     1     0     1     0     0     1     0       3

  3         0     0    23    20    56     3     0     8    41     6     157

  4         0     0     0    20    10     1     1    57    25     4     118

  5         0     0     2    46   430    10     6     5    81    10     590

  6         0     0     1     0     3    13     1     9     4     6      37

  7         0     0     1     1     6     0     7     2     6     5      28

  8         0     0    40    14    22     1     1    97     3     1     179

  9         1     2    90    10    53     3     6     0   124     4     293

 10         0     1     0     6     9     5     6     1     8    58      94


---------------------------------------------------------------------------
TOTAL       1     3   157   118   590    37    28   179   293    94    1500

PERCENT    .1    .2  10.5   7.9  39.3   2.5   1.9  11.9  19.5   6.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
              -----------------------------------------------
                 .1     .3   16.8   12.6   63.2    4.0    3.0

     PERCENT TEACHER TALK  66.43        PERCENT STEADY STATE  51.47

          PERCENT CONTENT  47.20              TOTAL I/I+D  29.87

          REVISED I/I+D  71.24                ROW 8 I/I+D  95.24

       ROW 8 - 9 I/I+D  64.61                 ROW 9 I/I+D  91.18

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER =00  MATH


---------------------------------------------------------------------------
           1     2     3     4     5     6     7     8     9    10       SUM


---------------------------------------------------------------------------
  1        0     0     0     0     1     0     0     0     0     0         1

  2        0     0     0     0     6     0     0     0     0     0         6

  3        0     1    25    16    61     4     1     8    16     7       139

  4        0     1     7    14    23     4     4    64    22    10       149

  5        1     3     5    79   272    25     4     4    43    24       460

  6        0     0     1     2    20     8     3     2    10    21        67

  7        0     0     1     1     4     1    10     0     6    15        38

  8        0     1    41    14    21     2     1    14     2     4       100

  9        0     0    52     4    26    10     7     1    53    15       168

 10        0     0     7    19    26    13     8     7    16    87       183


---------------------------------------------------------------------------
TOTAL      1     6   139   149   460    67    38   100   168   183      1311

PERCENT   .1    .5  10.6  11.4  35.1   5.1   2.9   7.6  12.8  14.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                       1      2      3      4      5      6      7
                     -------------------------------------------------
                      .1     .7   16.2   17.3   53.5    7.8    4.4

     PERCENT TEACHER TALK  76.24         PERCENT STEADY STATE  36.84

          PERCENT CONTENT  46.45                TOTAL I/I+D  34.30

            REVISED I/I+D  58.17                ROW 8 I/I+D  93.33

        ROW 8 - 9 I/I+D  62.57                  ROW 9 I/I+D  75.36

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=00    COMPOSITE MATRIX


----------------------------------------------------------------------------
          1     2     3     4     5     6     7     8     9    10      SUM


----------------------------------------------------------------------------
  1       0     0     0     0     3     0     0     0     0     0        3

  2       0     0     2     4    10     5     0     1     6     2       30

  3       0     3   106    67   185    21     1    32   111    20      546

  4       0     1     8    70    42     9     5   213    58    22      428

  5       1     5    11   159  1559    73    12    37   231   132     2220

  6       0     0     3     8    60    79     6    18    18    58      250

  7       0     0     3     2    15     2    24     2    15    22       85

  8       0     9   144    62    87     8     2   580     7     9      908

  9       2    11   260    23   138    19    16     2   349    23      843

 10       0     1     9    33   121    35    19    23    48   392      681


----------------------------------------------------------------------------
TOTAL     3    30   546   428  2220   250    85   908   843   681     5994

PERCENT  .1    .5   9.1   7.1  37.0   4.2   1.4  15.1  14.1  11.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
             ------------------------------------------------
               .1     .8   15.3   12.0   62.3    7.0    2.4

     PERCENT TEACHER TALK  67.04        PERCENT STEADY STATE  64.16

          PERCENT CONTENT  44.18               TOTAL I/I+D  28.27

           REVISED I/I+D  63.35                ROW 8 I/I+D  93.87

        ROW 8 - 9 I/I+D  65.43                ROW 9 I/I+D  88.64

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=08   LANGUAGE ARTS

--------------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10       SUM

--------------------------------------------------------------------
 1        0    0    0    0    0    0    0    0    0    0         0
 2        0    3    6    6    5    1    1    3    0    3        28
 3        0    9   56   21   49    6    4    2   20    6       173
 4        0    1    2   25   17    3    0  114   17    9       188
 5        0    6    9   64  580   31   16    9   28   48       791
 6        0    0    2    6   27   53    2    6    7   13       116
 7        0    1    5    6   20    1   77    3    2    7       122
 8        0    7   45   33   38    3    5  266    3   10       410
 9        0    1   46    8   18    5    7    1   49   11       146
10        0    0    2   19   37   13   10    6   20  238       345


--------------------------------------------------------------------
TOTAL     0   28  173  188  791  116  122  410  146  345      2319
PERCENT  .0  1.2  7.5  8.1 34.1  5.0  5.3 17.7  6.3 14.9

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              -----------------------------------------------
                .0    2.0   12.2   13.3   55.8    8.2    8.6

     PERCENT TEACHER TALK  71.83         PERCENT STEADY STATE  58.09

          PERCENT CONTENT  42.22                 TOTAL I/I+D  27.43

           REVISED I/I+D  45.79                 ROW 8 I/I+D  86.67

        ROW 8 - 9 I/I+D  64.81                  ROW 9 I/I+D  79.66

  THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=08   SOCIAL STUDIES

-----------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10      SUM

-----------------------------------------------------------------------
  1         3     0     2     0     1     0     1     0     3     0       10
  2         0     6     1     2     3     0     0     0     2     0       14
  3         1     1    84    35    53     5     2     3    17     3      204
  4         0     0     3    45     6     0     3    48    45     4      154
  5         1     3     3    36   523    16    13     3    34    12      644
  6         0     0     1     2    15    44     0     2     8     4       76
  7         0     0     0     2    14     2    20     1     4     8       51
  8         0     2    32    14     4     0     0   116     2     7      177
  9         4     2    77    12    15     4     7     1   189    31      342
 10         1     0     1     6    10     5     5     3    38   115      184

-----------------------------------------------------------------------
TOTAL      10    14   204   154   644    76    51   177   342   184     1856
PERCENT    .5    .8  11.0   8.3  34.7   4.1   2.7   9.5  18.4   9.9

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              ---------------------------------------------
                .9    1.2   17.7   13.4   55.9    6.6    4.4

     PERCENT TEACHER TALK  68.96        PERCENT STEADY STATE  61.69
          PERCENT CONTENT  43.00                 TOTAL I/I+D  33.13

            REVISED I/I+D  64.23                 ROW 8 I/I+D 100.00
        ROW 8 - 9 I/I+D  82.66                   ROW 9 I/I+D  88.30

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=08    MATH

--------------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10      SUM

--------------------------------------------------------------------------
  1         0     0     0     0     0     0     0     0     0     0        0
  2         0     0     0     0     1     0     0     0     0     0        1
  3         0     0    18    10    21     0     2     1     3     1       56
  4         0     0     0    17     7     0     1    94     6    27      152
  5         0     0     2    35   236    10    10     1     4     3      301
  6         0     0     0     2     5    24     1     4     2     4       42
  7         0     0     1     7    10     2    31     0     1     2       54
  8         0     1    23    61    15     3     6    56     1    17      183
  9         0     0    12     6     0     1     2     1    15     3       40
 10         0     0     0    14     6     2     1    26     8    33       90


--------------------------------------------------------------------------
TOTAL       0     1    56   152   301    42    54   183    40    90      919
PERCENT    .0    .1   6.1  16.5  32.8   4.6   5.9  19.9   4.4   9.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              ---------------------------------------------
                .0     .2    9.2   25.1   49.7    6.9    8.9

    PERCENT TEACHER TALK  73.10          PERCENT STEADY STATE  46.79
          PERCENT CONTENT  49.29                 TOTAL I/I+D  34.49

          REVISED I/I+D  37.25                   ROW 8 I/I+D  72.73
        ROW 8 - 9 I/I+D  79.23                   ROW 9 I/I+D  80.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=08   COMPOSITE MATRIX


-----------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10     SUM

-----------------------------------------------------------------
  1          5    1    2    0    1    0    1    0    3    0      13
  2          0   16   13   17   12    1    1    6    5    3      74
  3          1   14  229  108  196   17   13   23   75   12     688
  4          0    3   10  167   53    5    6  343  154   75     816
  5          2   13   25  207 2355   86   48   15  185   87    3023
  6          0    0    3   12   78  173    3   12   26   32     339
  7          0    2    7   20   57    5  164    6   20   18     299
  8          0   15  147  142   70    6   13  485   15   37     930
  9          4   10  249   80  123   17   30    3  633   75    1224
 10          1    0    3   63   78   29   20   37  108  616     955


-----------------------------------------------------------------
TOTAL       13   74  688  816 3023  339  299  930 1224  955    8361
PERCENT     .2   .9  8.2  9.8 36.2  4.1  3.6 11.1 14.6 11.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1     2     3     4     5     6     7
              ------------------------------------------
                 .2   1.4  13.1  15.5  57.6   6.5   5.7

   PERCENT TEACHER TALK  70.92       PERCENT STEADY STATE  63.84
        PERCENT CONTENT  45.92                TOTAL I/I+D  30.29

        REVISED I/I+D  54.85                 ROW 8 I/I+D  89.50
      ROW 8 - 9 I/I+D  71.41                 ROW 9 I/I+D  84.84

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=12    LANGUAGE ARTS


------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10    SUM
------------------------------------------------------------------
  1          0    0    0    0    0    0    0    0    0    0      0
  2          0    1    0    1    2    3    0    0    3    0     10
  3          0    3   23   27   42   12    1   34   28    9    179
  4          0    0    2   45   11    6    3  101   12   13    193
  5          0    2    4   47  648   36    8   71   51   34    901
  6          0    0    1    8   17   74    3   18   34   31    186
  7          0    0    0    2   15    6   28    5    7   11     74
  8          0    0   82   37   93    7    9  387   12   20    647
  9          0    3   64   11   40   22    9    2  250   23    424
 10          0    1    3   15   33   20   13   29   27  187    328

------------------------------------------------------------------
TOTAL        0   10  179  193  901  186   74  647  424  328   2942
PERCENT     .0   .3  6.1  6.6 30.6  6.3  2.5 22.0 14.4 11.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1     2     3     4     5     6     7
          -----------------------------------------
              .0    .6  11.6  12.5  58.4  12.1   4.8

    PERCENT TEACHER TALK  59.03        PERCENT STEADY STATE  55.85
         PERCENT CONTENT  37.19               TOTAL I/I+D  24.76

         REVISED I/I+D  42.09               ROW 8 I/I+D  83.67
        ROW 8 - 9 I/I+D  52.25               ROW 9 I/I+D  68.37

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=12   SOCIAL STUDIES

------------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10       SUM

------------------------------------------------------------------------
   1        0    0    0    0    1    0    0    0    0    0         1
   2        0    0    0    0    0    0    0    0    0    0         0
   3        0    0    1    1    2    2    0    0    4    0        10
   4        0    0    0    7    1    0    0    7    1    0        16
   5        1    0    0    0    6    2    0    2    4    0        15
   6        0    0    0    0    0    0    1    2    1    1         5
   7        0    0    0    0    0    0    2    2    0    0         4
   8        0    0    4    4    2    1    1   97    4    0       113
   9        0    0    5    3    2    0    0    2    9    4        25
  10        0    0    0    1    1    0    0    1    2    1         6


------------------------------------------------------------------------
TOTAL       1    0   10   16   15    5    4  113   25    6       195
PERCENT    .5   .0  5.1  8.2  7.7  2.6  2.1 57.9 12.8  3.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
             1      2      3      4      5      6      7
         ------------------------------------------------
           2.0     .0   19.6   31.4   29.4    9.8    7.8

    PERCENT TEACHER TALK  26.98        PERCENT STEADY STATE  63.08
         PERCENT CONTENT  15.90                 TOTAL I/I+D  52.94

       REVISED I/I+D  55.00                   ROW 8 I/I+D  66.67
     ROW 8 - 9 I/I+D  72.73                   ROW 9 I/I+D 100.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=12   MATH


-----------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10       SUM

-----------------------------------------------------------------------
  1         1    0    0    1    0    0    0    0    2    0         4
  2         0    1    1    2    0    0    0    0    1    3         8
  3         0    1   47   35   50    8    1   12   17    8       179
  4         0    0    1   24   11    8    3  133   12   20       212
  5         0    0   13   64  384   31    5   30   66   63       656
  6         0    0    2    6   23   66    4    8   22   39       170
  7         0    0    1    7   14    3   34    6   11    8        84
  8         1    3   68   42   62    9    5  162   11   15       378
  9         2    2   41   16   61   22   21    5   85   43       298
 10         0    1    5   15   51   23   11   22   71  491       690


-----------------------------------------------------------------------
TOTAL       4    8  179  212  656  170   84  378  298  690      2679

PERCENT    .1   .3  6.7  7.9 24.5  6.3  3.1 14.1 11.1 25.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

               1     2     3     4     5     6     7
            ------------------------------------------
              .3    .6  13.6  16.1  50.0  12.9   6.4

    PERCENT TEACHER TALK  66.01        PERCENT STEADY STATE  48.34

         PERCENT CONTENT  32.40                TOTAL I/I+D  30.69

          REVISED I/I+D  42.92                 ROW 8 I/I+D  83.72

      ROW 8 + 9 I/I+D  49.30                   ROW 9 I/I+D  51.14

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER*12 - COMPOSITE MATRIX


-----------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------------
   1         1    0    0    1    1    0    0    0    3    0        6
   2         0    2    2    4    2    3    0    0    4    3       20
   3         0    6   77   75  111   23    2   49   52   17      412
   4         0    0    3   89   27   16    7  273   27   35      477
   5         1    2   19  127 1109   72   13  106  137  102     1688
   6         0    0    3   14   42  145    9   30   58   78      379
   7         0    0    1   10   30    9   65   14   20   22      171
   8         1    3  179   90  162   19   16  694   30   36     1230
   9         3    5  120   32  113   44   32   10  352   73      784
  10         0    2    8   35   91   48   27   54  101  709     1074


-----------------------------------------------------------------------
TOTAL        6   20  412  477 1688  379  171 1230  784 1074     6241
PERCENT     .1   .3  6.6  7.6 27.0  6.1  2.7 19.7 12.6 17.2

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
           ----------------------------------------
             .2    .6  13.1  15.1  53.5  12.0   5.4

    PERCENT TEACHER TALK  61.02        PERCENT STEADY STATE  53.79
         PERCENT CONTENT  34.69               TOTAL I/I+D  29.02

         REVISED I/I+D  44.33                 ROW 8 I/I+D  83.94
       ROW 8 - 9 I/I+D  52.87                 ROW 9 I/I+D  62.75

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100. I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=13   LANGUAGE ARTS


 -----------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM


 -----------------------------------------------------------------
   1       0    0    0    0    0    0    0    0    0    0        0
   2       0    1    1    3    3    0    0    4    1    3       16
   3       0    2   12   17   12    0    0   11    5    7       66
   4       0    2    0   21    6    2    1   67   20   10      129
   5       0    1    1   26  129    7    8   17    5   19      213
   6       0    0    1    2    4    9    0    2    0    7       25
   7       0    1    0    2    3    1    2    2    2    2       15
   8       0    9   39   25   29    0    1   63    2   10      178
   9       0    0   12   13   10    3    2    1  479   10      530
  10       0    0    0   20   17    3    1   11   16   96      164


 -----------------------------------------------------------------
TOTAL      0   16   66  129  213   25   15  178  530  164     1336

PERCENT   .0  1.2  4.9  9.7 15.9  1.9  1.1 13.3 39.7 12.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1     2     3     4     5     6     7
              -----------------------------------------
               .0   3.4  14.2  27.8  45.9   5.4   3.2

    PERCENT TEACHER TALK  39.59        PERCENT STEADY STATE  60.78

         PERCENT CONTENT  25.60                TOTAL I/I+D  45.47

          REVISED I/I+D  67.21                 ROW 8 I/I+D  97.96

      ROW 8 - 9 I/I+D  68.53                   ROW 9 I/I+D  70.59

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=13   SOCIAL STUDIES


-------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10      SUM

-------------------------------------------------------------------
   1        0    0    1    0    0    0    0    0    0    0        1
   2        0    1    1    2    0    0    0    0    1    4        9
   3        0    0    9   16   14    1    1    6    3    9       59
   4        0    2    2   17    7    0    0   30   23   16       97
   5        1    3    3   16   84   14    2   48   10   14      195
   6        0    0    2    3    6   20    1    4   10   15       61
   7        0    1    1    1    2    1    4    0    3    0       13
   8        0    0   18   11   54    3    0  567    3    9      665
   9        0    2   19   14    7    6    4    2  348   27      429
  10        0    0    3   17   21   16    1    8   28  129      223


-------------------------------------------------------------------
TOTAL       1    9   59   97  195   61   13  665  429  223     1752
PERCENT    .1   .5  3.4  5.5 11.1  3.5   .7 38.0 24.5 12.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
           ------------------------------------------
             .2   2.1  13.6  22.3  44.8  14.0   3.0

   PERCENT TEACHER TALK  28.45        PERCENT STEADY STATE  67.29
        PERCENT CONTENT  16.67                TOTAL I/I+D  38.16

        REVISED I/I+D  48.25                 ROW 8 I/I+D  85.71
      ROW 8 - 9 I/I+D  46.38                 ROW 9 I/I+D  67.74

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=13   MATH

-----------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------------
   1         0    0    0    1    0    0    0    0    0    0        1
   2         0    2    0    3    5    2    0    3    0    5       20
   3         1    3    4   20   13    3    2   12    7    8       73
   4         0    1    2   18   12    4    1   58    3   15      114
   5         0    2    5   34   49    4    1    9    5   14      123
   6         0    2    4    2    4   19    1    4    1   12       49
   7         0    2    0    1    0    1    0    0    0    3        7
   8         0    5   43   18   20    1    1   33    7    8      136
   9         0    0   12    2    7    0    0    2   16    3       42
  10         0    3    3   15   13   15    1   15    3   76      144


-----------------------------------------------------------------------
TOTAL        1   20   73  114  123   49    7  136   42  144      709
PERCENT     .1  2.8 10.3 16.1 17.3  6.9  1.0 19.2  5.9 20.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
             -------------------------------------------------
                .3    5.2   18.9   29.5   31.8   12.7    1.8

     PERCENT TEACHER TALK  68.50          PERCENT STEADY STATE  30.61

          PERCENT CONTENT  33.43                  TOTAL I/I+D  53.75

         REVISED I/I+D  62.67                   ROW 8 I/I+D  96.00

       ROW 8 - 9 I/I+D  73.39                   ROW 9 I/I+D 100.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=13   COMPOSITE MATRIX


 ----------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10        SUM

 ----------------------------------------------------------------------
   1         0    0    2    1    1    0    1    0    0    0          5
   2         1    4    2    8   11    4    0    7    4   13         54
   3         1    8   58   61   74    8    3   29   28   27        297
   4         0    6    4   86   32    8    2  238   56   49        481
   5         1    9    9  112  843   40   16   74   66  107       1277
   6         1    2    7   18   22  143    5   11   15   63        287
   7         0    4    1    6   14    6   18    3    5    6         63
   8         0   14  113   83  124   10    2  712   17   43       1118
   9         1    3   94   33   49   11    8    6  995   58       1258
  10         0    4    7   73  107   57    8   38   72  559        925


 ----------------------------------------------------------------------
TOTAL        5   54  297  481 1277  287   63 1118 1258  925       5765
PERCENT     .1   .9  5.2  8.3 22.2  5.0  1.1 19.4 21.8 16.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
                -----------------------------------------
                 .2    2.2   12.1   19.5   51.8   11.6    2.6

     PERCENT TEACHER TALK  50.91          PERCENT STEADY STATE  79.81
          PERCENT CONTENT  30.49                 TOTAL I/I+D  33.97

          REVISED I/I+D  50.42                    ROW 8 I/I+D  91.37
        ROW 8 - 9 I/I+D  62.57                    ROW 9 I/I+D  83.76

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=15   LANGUAGE ARTS

----------------------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10        SUM

----------------------------------------------------------------------------------
  1         3     3     0     0     2     0     2     0     0     0         10
  2         0     8     0     2     8     2     1     4     6     1         32
  3         0     3     8     9    20     8     0     4     3     4         59
  4         0     0     0     7     6     2     1    56     3     1         76
  5         3     7     8    37   220    15     3    15    16     4        328
  6         2     2     2     5     3    39     5    17     2    10         87
  7         2     0     1     1     3     3     5     1     3     1         20
  8         0     6    22    11    49     8     2   177     3     2        280
  9         0     3    16     1    12     3     1     1    12     1         50
 10         0     0     2     3     5     7     0     5     2    33         57


----------------------------------------------------------------------------------
TOTAL      10    32    59    76   328    87    20   280    50    57        999
PERCENT   1.0   3.2   5.9   7.6  32.8   8.7   2.0  28.0   5.0   5.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1      2      3      4      5      6      7
                 ----------------------------------------------
                   1.6    5.2    9.6   12.4   53.6   14.2    3.3

       PERCENT TEACHER TALK  64.97          PERCENT STEADY STATE  51.25
            PERCENT CONTENT  40.44                 TOTAL I/I+D  28.92

            REVISED I/I+D  48.56                   ROW 8 I/I+D  73.68
        ROW 8 - 9 I/I+D  44.03                     ROW 9 I/I+D  82.61

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=15   SOCIAL STUDIES

-----------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10     SUM

-----------------------------------------------------------------
  1         1    1    0    0    1    0    0    0    1    1       5
  2         0    3    9    1    1    0    0    5    9    3      31
  3         1    6   24   23   46    2    0   14   27    2     145
  4         0    0    4   18   12    1    0   76   12    4     127
  5         1    3    4   44  302    7    5   12   33    7     418
  6         0    1    1    5    8   10    0    3    1    4      33
  7         1    1    1    2    2    1    1    2    0    0      11
  8         0    4   45   20   23    3    4  217   18   10     344
  9         1    9   55   11   16    3    1    8  185    8     297
 10         0    3    2    3    7    6    0    7   11   27      66


-----------------------------------------------------------------
TOTAL       5   31  145  127  418   33   11  344  297   66    1477
PERCENT    .3  2.1  9.8  8.6 28.3  2.2   .7 23.3 20.1  4.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
            1     2     3     4     5     6     7
         ----------------------------------------
           .6   4.0  18.8  16.5  54.3   4.3   1.4

    PERCENT TEACHER TALK  54.57       PERCENT STEADY STATE  53.35
         PERCENT CONTENT  36.90              TOTAL I/I+D  40.00

         REVISED I/I+D  80.44                ROW 8 I/I+D  87.50
     ROW 8 - 9 I/I+D  74.36                  ROW 9 I/I+D  94.20

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=15   MATH

-------------------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10      SUM

-------------------------------------------------------------------------------
   1        2    0    0    1    1    2    0    0    0    0        6
   2        1    9    2    9    4    7    0    3    9    2       46
   3        1    6   25   16   34    7    0    7   15    8      119
   4        1    1    1   54   13    2    1  141   18   36      268
   5        0    4    4   86  343   20    3   26   48   23      557
   6        0    4    2   13   23   42    3   10   14   13      124
   7        1    0    0    3    2    6   13    2    2    3       32
   8        0    9   28   44   90   11    2  127   14   26      351
   9        0   11   53   14   28   12    8    5   77   12      220
  10        0    2    4   28   19   15    2   30   23  138      261


-------------------------------------------------------------------------------
TOTAL       6   46  119  268  557  124   32  351  220  261     1984
PERCENT    .3  2.3  6.0 13.5 28.1  6.3  1.6 17.7 11.1 13.2

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1      2      3      4      5      6      7
                 --------------------------------------------------
                   .5    4.0   10.3   23.3   48.4   10.8    2.8

     PERCENT TEACHER TALK  66.86          PERCENT STEADY STATE  41.83
          PERCENT CONTENT  41.58                   TOTAL I/I+D  38.11

          REVISED I/I+D  52.29                     ROW 8 I/I+D  74.00
        ROW 8 - 9 I/I+D  51.29                     ROW 9 I/I+D  76.19

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=15   COMPOSITE MATRIX


 -----------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10        SUM

 -----------------------------------------------------------------------
   1       10    4    2    1    8    3    2    0    5    1         36
   2        2   25   15   15   14   10    1   12   26    6        126
   3        4   18  106   59  144   19    0   29   92   19        490
   4        1    1    7  110   44    6    2  338   75   46        630
   5        8   17   22  208 1316   52   13   60  148   53       1897
   6        2    7    5   29   40  129    8   37   25   42        324
   7        4    1    3    6    9   10   23    6   12    4         78
   8        0   19  112  106  187   26    8  743   51   41       1293
   9        5   29  206   52   93   26   15   22 1049   55       1552
  10        0    5   12   44   42   43    6   46   69  373        640


 -----------------------------------------------------------------------
TOTAL      36  126  490  630 1897  324   78 1293 1552  640       7066
PERCENT    .5  1.8  6.9  8.9 26.8  4.6  1.1 18.3 22.0  9.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
              ---------------------------------------------
               1.0    3.5   13.7   17.6   53.0    9.0    2.2

    PERCENT TEACHER TALK  55.73          PERCENT STEADY STATE  67.87
         PERCENT CONTENT  35.76                 TOTAL I/I+D  35.80

        REVISED I/I+D  61.86                   ROW 8 I/I+D  79.39
      ROW 8 - 9 I/I+D  59.84                   ROW 9 I/I+D  85.41

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=19   LANGUAGE ARTS

-----------------------------------------------------------------------
          1     2     3     4     5     6     7     8     9    10     SUM

-----------------------------------------------------------------------
  1       0     0     0     0     0     0     0     0     0     1       1

  2       0     1     2     1     1     0     0     0     1     1       7

  3       0     4    30    14    26     1     1     4     3     4      87

  4       0     0     1    40    12     3     1    64    12     9     142

  5       0     1     2    34   327    22     6     3    16    28     439

  6       0     0     0     5    12   112     1     3     4    36     173

  7       0     0     0     4     3     3    26     1     2     4      43

  8       0     0    30    24    18     3     0    80     0     5     160

  9       0     1    16     7    13     1     2     1    55     5     101

 10       1     0     6    13    27    28     6     4     8   377     470


-----------------------------------------------------------------------
TOTAL     1     7    87   142   439   173    43   160   101   470    1623

PERCENT  .1    .4   5.4   8.7  27.0  10.7   2.6   9.9   6.2  29.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

                1     2     3     4     5     6     7
              -----------------------------------------
               .1    .8   9.8  15.9  49.2  19.4   4.8

      PERCENT TEACHER TALK  77.36       PERCENT STEADY STATE  64.57

           PERCENT CONTENT  35.80               TOTAL I/I+D  26.57

           REVISED I/I+D  30.55                 ROW 8 I/I+D  90.91

          ROW 8 - 9 I/I+D  67.83                ROW 9 I/I+D  85.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=19   SOCIAL STUDIES


 ------------------------------------------------------------------------
              1     2     3     4     5     6     7     8     9    10        SUM

 ------------------------------------------------------------------------
    1         1     0     0     0     1     0     0     0     0     0          2
    2         0     2     2     1     7     2     0     0     7     3         24
    3         0     6    48    31    68     2     0    12    24     7        198
    4         0     0     5    44    16     1     1    76    44    18        205
    5         1     8    18    59   457    17     5    21    37    31        654
    6         0     0     2     4    14    75     4     2     4    12        117
    7         0     1     3     4     7     3    28     1     6     3         56
    8         0     2    39    24    32     3     5   122    13    15        255
    9         0     4    72    15    19     7    10     3   230    18        378
   10         0     1     9    23    33     7     3    18    13   102        209


 ------------------------------------------------------------------------
TOTAL         2    24   198   205   654   117    56   255   378   209       2098
PERCENT      .1   1.1   9.4   9.8  31.2   5.6   2.7  12.2  18.0  10.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1       2       3       4       5       6       7
                 ------------------------------------------------
                   .2     1.9    15.8    16.3    52.1     9.3     4.5

     PERCENT TEACHER TALK  66.49          PERCENT STEADY STATE  52.86
           PERCENT CONTENT  40.94                    TOTAL I/I+D  34.16

            REVISED I/I+D  56.42                    ROW 8 I/I+D  83.67
          ROW 8 - 9 I/I+D  67.24                    ROW 9 I/I+D  81.72

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=19   MATH

----------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10     SUM

----------------------------------------------------------------
  1        0    0    0    0    0    0    0    0    0    0       0
  2        0    2    1    3    4    0    0    0    0    3      13
  3        0    2   12    7   27    5    1    2    0    4      60
  4        0    0    1   19   11    2    2   57    1   11     104
  5        0    6    3   42  542   16    4   32   13   73     731
  6        0    0    1    0   17   45    1    1    1   24      90
  7        0    0    0    1    7    1   28    2    1    8      48
  8        0    2   24   14   43    1    3   73    2    7     169
  9        0    0    7    3    7    0    2    0   12    7      38
 10        0    1   11   15   73   20    7    2    8  546     683


----------------------------------------------------------------
TOTAL      0   13   60  104  731   90   48  169   38  683    1936
PERCENT   .0   .7  3.1  5.4 37.8  4.6  2.5  8.7  2.0 35.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1     2     3     4     5     6     7
              ----------------------------------------
               .0   1.2   5.7   9.9  69.9   8.6   4.6

    PERCENT TEACHER TALK  83.48          PERCENT STEADY STATE  66.06
         PERCENT CONTENT  43.13                  TOTAL I/I+D  16.92

         REVISED I/I+D  34.60                   ROW 8 I/I+D  86.67
       ROW 8 - 9 I/I+D  47.17                   ROW 9 I/I+D  77.78

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=19   COMPOSITE MATRIX


-----------------------------------------------------------------------
               1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------------
  1            1    0    0    0    1    0    0    0    0    1        3
  2            0    8    6    7   14    2    0    1    8 [illegible]  57
  3            0   12  100   58  138    8    2   18   34   17      387
  4            0    3    8  135   50    6    4  227   65   62      560
  5            1   18   23  170 1814   66   16   58   88  147     2401
  6            0    1    3   11   50  275    6    6   11   77      440
  7            0    1    3   10   18    7   83    4   11   17      154
  8            0    5  101   70  110    8    8  298   16   31      647
  9            0    6  117   33   47   10   17    4  422   38      694
 10            1    3   26   66  159   58   18   31   39 1089     1490


-----------------------------------------------------------------------
TOTAL          3   57  387  560 2401  440  154  647  694 1490     6833
PERCENT       .0   .8  5.7  8.2 35.1  6.4  2.3  9.5 10.2 21.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1      2      3      4      5      6      7
            -------------------------------------------------
              .1    1.4    9.7   14.0   60.0   11.0    3.8

   PERCENT TEACHER TALK  74.90          PERCENT STEADY STATE  68.62
        PERCENT CONTENT  43.33                   TOTAL I/I+D  25.16

         REVISED I/I+D  42.94                   ROW 8 I/I+D  86.89
      ROW 8 - 9 I/I+D  62.41                   ROW 9 I/I+D  82.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=24   LANGUAGE ARTS

----------------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

----------------------------------------------------------------------------
  1        0    0    0    0    0    0    0    0    0    0        0
  2        0    1    2    1    4    2    0    1    3    0       14
  3        0    4   15   28   21    8    0   19   10    7      112
  4        0    1    6   11    6    2    4   74   10    7      121
  5        0    4    3   20   79    9    1   26   15   42      199
  6        0    0    0    2   13   24    0   12    6   13       70
  7        0    0    0    4    0    1    2    1    1    1       10
  8        0    2   60   36   28    9    1  270    6   46      458
  9        0    2   22   11   16    2    0    4   51    4      112
 10        0    0    4    8   32   13    2   50   10  175      294


----------------------------------------------------------------------------
TOTAL      0   14  112  121  199   70   10  458  112  294     1390
PERCENT   .0  1.0  8.1  8.7 14.3  5.0   .7 32.9  8.1 21.2

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
              ---------------------------------------------
               .0    2.7   21.3   23.0   37.8   13.3    1.9

   PERCENT TEACHER TALK  47.99          PERCENT STEADY STATE  45.18
        PERCENT CONTENT  23.02                 TOTAL I/I+D  46.96

        REVISED I/I+D  61.17                   ROW 8 I/I+D  86.11
    ROW 8 - 9 I/I+D  70.37                     ROW 9 I/I+D  92.31

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=24   SOCIAL STUDIES


 -----------------------------------------------------------------
              1    2    3    4    5    6    7    8    9   10      SUM

 -----------------------------------------------------------------
   1          0    0    0    0    0    0    0    0    0    0        0

   2          0    0    0    0    0    0    0    0    1    0        1

   3          0    0    3    0    4    0    0    0    9    1       17

   4          0    0    0    0    0    0    0    9    1    0       10

   5          0    0    0    3   47    3    4   38    8    8      111

   6          0    0    0    0    0    4    0    1    0    3        8

   7          0    0    0    1    3    0    6    1    0    4       15

   8          0    0    1    4   39    0    0   62    3    6      115

   9          0    1   13    1    4    1    0    1  107    2      130

  10          0    0    0    1   14    0    5    3    1   22       46


 -----------------------------------------------------------------
TOTAL         0    1   17   10  111    8   15  115  130   46      453

PERCENT      .0   .2  3.8  2.2 24.5  1.8  3.3 25.4 28.7 10.2

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1     2     3     4     5     6     7
              ------------------------------------------
                .0    .6  10.5   6.2  68.5   4.9   9.3

    PERCENT TEACHER TALK  39.80        PERCENT STEADY STATE  55.41

         PERCENT CONTENT  26.71                TOTAL I/I+D  17.28

         REVISED I/I+D  43.90                  ROW 8 I/I+D 100.00

       ROW 8 - 9 I/I+D  31.25                  ROW 9 I/I+D  93.33

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=24   MATH

-------------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10       SUM

-------------------------------------------------------------------------
   1         2    0    0    0    1    1    0    0    1    0         5
   2         1   14    7   16   11    3    1   10   14   11        88
   3         0   10  102  107   98   15    1   28   44   31       436
   4         0    8    9  135   28    5    4  457   44   56       746
   5         1    6    9  160  689   80    6   65   33   59      1108
   6         0    3    3   30   58  185    1   11   19   52       362
   7         0    4    0    8    6    3   11    2   10    9        53
   8         1   21  193  186  122   13    8  240   42   36       862
   9         0   13  103   40   19   12   11   15  259   64       536
  10         0    9   10   64   76   45   10   34   70  913      1231


-------------------------------------------------------------------------
TOTAL        5   88  436  746 1108  362   53  862  536 1231      5427
PERCENT     .1  1.6  8.0 13.7 20.4  6.7  1.0 15.9  9.9 22.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               ----------------------------------------------
                 .2    3.1   15.6   26.7   39.6   12.9    1.9

    PERCENT TEACHER TALK  66.68        PERCENT STEADY STATE  46.99
         PERCENT CONTENT  34.16              TOTAL I/I+D  45.57

         REVISED I/I+D  56.04                ROW 8 I/I+D  91.10
       ROW 8 - 9 I/I+D  75.07                ROW 9 I/I+D  83.45

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=24   COMPOSITE MATRIX


 ------------------------------------------------------------------
              1    2    3    4    5    6    7    8    9   10     SUM

 ------------------------------------------------------------------
   1          2    0    0    0    1    1    0    0    1    0       5
   2          1   16    9   19   15    6    1   11   21   12     111
   3          0   15  126  143  133   25    1   49   75   42     609
   4          0    9   15  153   37    8    9  577   64   67     939
   5          1   12   15  195  912   99   15  133   69  120    1571
   6          0    5    3   33   78  235    2   25   27   78     486
   7          0    4    0   15   13    4   25    8   12   19     100
   8          1   24  265  248  200   24   12  629   55   89    1547
   9          0   17  162   54   51   18   14   21  443   72     852
  10          0    9   14   79  131   66   21   93   85 1303    1801


 ------------------------------------------------------------------
TOTAL         5  111  609  939 1571  486  100 1547  852 1801    8021
PERCENT      .1  1.4  7.6 11.7 19.6  6.1  1.2 19.3 10.6 22.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                   1     2     3     4     5     6     7
                ------------------------------------------
                  .1   2.9  15.9  24.6  41.1  12.7   2.6

    PERCENT TEACHER TALK  61.43        PERCENT STEADY STATE  51.00
         PERCENT CONTENT  31.29               TOTAL I/I+D  43.55

         REVISED I/I+D  55.30                ROW 8 I/I+D  88.96
      ROW 8 - 9 I/I+D  70.73                ROW 9 I/I+D  84.83

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=26   LANGUAGE ARTS

---------------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

---------------------------------------------------------------------------
  1        1    2    1    0    1    1    1    0    2    0        9
  2        0    8    9   28   14    3    0    8   14    2       86
  3        0   12   21   46   38    5    0   60    7    9      198
  4        0    5    5   83   47    2    0  175   18   73      408
  5        3    5    6  101  324   30    3   29   32   33      566
  6        1    0    0    3   20   75    2   14    2   28      145
  7        0    0    0    1    2    3    7    2    6    5       26
  8        0   34  129   70   48    5    3  220    6   19      534
  9        3   16   20    8   30    1    7    1  104    9      199
 10        1    4    7   68   42   20    3   25    8  303      481


---------------------------------------------------------------------------
TOTAL      9   86  198  408  566  145   26  534  199  481     2652
PERCENT   .3  3.2  7.5 15.4 21.3  5.5  1.0 20.1  7.5 18.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
             1     2     3     4     5     6     7
           ----------------------------------------
            .6   6.0  13.8  28.4  39.4  10.1   1.8

     PERCENT TEACHER TALK  66.24         PERCENT STEADY STATE  43.21
           PERCENT CONTENT  36.73                 TOTAL I/I+D  48.75

              REVISED I/I+D  63.15                ROW 8 I/I+D  95.32
           ROW 8 - 9 I/I+D  74.87                 ROW 9 I/I+D  82.98

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=26   SOCIAL STUDIES

------------------------------------------------------------------------
           1     2     3     4     5     6     7     8     9    10     SUM

------------------------------------------------------------------------
   1       0     0     0     0     0     0     0     0     0     0       0
   2       0     0     1     5     3     0     0     0     0     1      10
   3       0     1    24    25    27     2     1    23     7     4     114
   4       0     1     4    51    29     2     3    61     5    52     208
   5       0     3    14    67   278     8     2     6     9    33     420
   6       0     0     0     3     8     6     0     1     3     2      23
   7       0     0     0     4     1     0     4     0     3     0      12
   8       0     4    54    18    14     0     0     9     1     5     105
   9       0     1    12     1    12     1     1     0     5     4      37
  10       0     0     5    34    48     4     1     5     4    83     184

------------------------------------------------------------------------
TOTAL      0    10   114   208   420    23    12   105    37   184    1113
PERCENT   .0    .9  10.2  18.7  37.7   2.1   1.1   9.4   3.3  16.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1      2      3      4      5      6      7
                 ----------------------------------------------
                   .0    1.3   14.5   26.4   53.4    2.9    1.5

    PERCENT TEACHER TALK  84.71          PERCENT STEADY STATE  41.33

          PERCENT CONTENT  56.42                   TOTAL I/I+D  42.19

            REVISED I/I+D  77.99                   ROW 8 I/I+D 100.00

        ROW 8 - 9 I/I+D  76.27                     ROW 9 I/I+D  86.67

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=26    MATH

------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10     SUM

------------------------------------------------------------------
   1       0    0    0    0    0    0    0    0    0    0       0

   2       0    2    1    3    2    0    0    1    0    0       9

   3       0    1    6   24    9    7    0    4    0    0      51

   4       0    1    1   43    9    8    0   93    0   34     189

   5       0    0    1   29  123    8    0    9    1    7     178

   6       0    0    0    8    8   29    0   12    0   17      74

   7       0    0    0    1    2    0    2    1    0    1       7

   8       0    5   40   50   19    8    3  173    0   11     309

   9       0    0    0    1    0    1    0    0    0    0       2

  10       0    0    2   30    6   13    2   16    1  241     311


------------------------------------------------------------------
TOTAL      0    9   51  189  178   74    7  309    2  311    1130

PERCENT   .0   .8  4.5 16.7 15.8  6.5   .6 27.3   .2 27.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1     2     3     4     5     6     7
               -----------------------------------------
                 .0   1.8  10.0  37.2  35.0  14.6   1.4

     PERCENT TEACHER TALK  62.03        PERCENT STEADY STATE  54.78

          PERCENT CONTENT  32.48                TOTAL I/I+D  49.02

          REVISED I/I+D  42.55                ROW 8 I/I+D  80.36

          ROW 8 - 9 I/I+D  75.59                ROW 9 I/I+D    .00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=26   COMPOSITE MATRIX

-----------------------------------------------------------------------
          1     2     3     4     5     6     7     8     9    10     SUM
-----------------------------------------------------------------------
  1       1     2     1     0     1     1     1     0     3     0      10
  2       0    18    13    45    19     3     0    13    17     5     133
  3       0    16    80   123    94    17     1    95    21    20     467
  4       0    12    10   281   105    16     8   439    36   206    1113
  5       4    10    27   245   966    48     6    48    51    85    1490
  6       1     0     1    17    37   123     2    33     7    55     276
  7       0     0     1    13     5     3    16     4    10     6      58
  8       0    50   273   197   100    18     8   513     8    40    1207
  9       3    20    47    20    50     4     9     2   175    15     345
 10       1     5    14   172   113    43     7    60    17   768    1200

-----------------------------------------------------------------------
TOTAL    10   133   467  1113  1490   276    58  1207   345  1200    6299
PERCENT  .2   2.1   7.4  17.7  23.7   4.4    .9  19.2   5.5  19.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1      2      3      4      5      6      7
            -------------------------------------------------
             .3    3.7   13.2   31.4   42.0    7.8    1.6

    PERCENT TEACHER TALK  69.56          PERCENT STEADY STATE  57.61
         PERCENT CONTENT  41.32                   TOTAL I/I+D  48.58

         REVISED I/I+D  64.62                     ROW 8 I/I+D  92.55
      ROW 8 - 9 I/I+D  76.35                      ROW 9 I/I+D  84.34

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=27   LANGUAGE ARTS

-----------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10       SUM

-----------------------------------------------------------------------
   1        0     0     0     1     0     0     0     0     0     1         2

   2        0     0     7     8     5     3     0     5     3     4        35

   3        1     3    93    93    79    28     2    54    31    24       408

   4        0     0     6    69    34     8     4   237    21    70       449

   5        0     6    12   100   352    34     3   104    42    84       737

   6        0     2     1     9    25    72     2    42     3    38       194

   7        0     0     0     3     7     1     3     5     2     3        24

   8        0    10   218    74   117    24     4   907    15    30      1399

   9        0     6    67    19    27     3     4     3    74     5       208

  10        1     8     4    73    91    21     2    42    17   575       834


-----------------------------------------------------------------------
TOTAL       2    35   408   449   737   194    24  1399   208   834      4290

PERCENT    .0    .8   9.5  10.5  17.2   4.5    .6  32.6   4.8  19.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
             --------------------------------------------------
                .1    1.9   22.1   24.3   39.9   10.5    1.3

     PERCENT TEACHER TALK  53.50          PERCENT STEADY STATE  50.00

          PERCENT CONTENT  27.65                 TOTAL I/I+D  48.35

           REVISED I/I+D  67.12                  ROW 8 I/I+D  89.06

         ROW 8 - 9 I/I+D  68.76                  ROW 9 I/I+D  91.25

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=27   SOCIAL STUDIES


 ------------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10       SUM

 ------------------------------------------------------------------------
   1         0    2    0    0    2    0    0    0    0    1         5

   2         0    1    4    0    2    0    0    0    5    5        17

   3         1    4   47    4   23    4    2    2   25    7       119

   4         0    1    0    4    5    1    2   17    8    4        42

   5         2    2    9   15   51   11    2    1   15    9       117

   6         0    0    1    2   11   28    1    0    8    8        59

   7         0    0    1    1    1    2    1    0    3    6        15

   8         0    0    8    6    4    0    0   32    3    0        53

   9         2    5   46    6   10    3    2    1   96    9       180

  10         0    2    3    4    8   10    5    0   17   91       140


 ------------------------------------------------------------------------
TOTAL        5   17  119   42  117   59   15   53  180  140       747

PERCENT     .7  2.3 15.9  5.6 15.7  7.9  2.0  7.1 24.1 18.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1      2      3      4      5      6      7
            ----------------------------------------------
             1.3    4.5   31.8   11.2   31.3   15.8    4.0

    PERCENT TEACHER TALK  61.61         PERCENT STEADY STATE  46.99

         PERCENT CONTENT  21.29                 TOTAL I/I+D  48.93

          REVISED I/I+D  65.58                 ROW 8 I/I+D 100.00

       ROW 8 - 9 I/I+D  79.35                 ROW 9 I/I+D  91.38

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=27   MATH

-------------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10        SUM

-------------------------------------------------------------------------
   1         0    0    0    0    0    0    0    0    0    0          0

   2         0    4    2    3    6    0    0    4    1    8         28

   3         0    7   20   18   43    4    0   12    9    9        122

   4         0    0    1   17   14    0    0   80    1   13        126

   5         0    7    9   44  140    7    4   62   10   18        301

   6         0    0    0    0    7   30    0    1    1    7         46

   7         0    0    0    1    2    0    1    2    1    2          9

   8         0    8   65   28   59    3    2   78    2   17        262

   9         0    2   15    0   12    0    1    0   28    1         59

  10         0    0   10   15   20    2    1   23    6  144        221


-------------------------------------------------------------------------
TOTAL        0   28  122  126  301   46    9  262   59  221       1174

PERCENT     .0  2.4 10.4 10.7 25.6  3.9   .8 22.3  5.0 18.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1     2     3     4     5     6     7
                -----------------------------------------
                 .0   4.4  19.3  19.9  47.6   7.3   1.4

     PERCENT TEACHER TALK  66.32        PERCENT STEADY STATE  39.35

          PERCENT CONTENT  36.37               TOTAL I/I+D  43.67

           REVISED I/I+D  73.17                ROW 8 I/I+D  93.59

        ROW 8 - 9 I/I+D  60.51                ROW 9 I/I+D  94.44

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=27   COMPOSITE MATRIX

---------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10      SUM

---------------------------------------------------------------------
  1          0    2    0    1    2    0    0    0    0    2        7
  2          0    6   13   11   13    4    0    9    9   17       82
  3          2   14  161  124  148   37    5   69   67   41      668
  4          0    1    7   92   53   10    6  347   33   89      638
  5          2   16   30  162  548   53    9  169   71  115     1175
  6          0    2    2   12   43  142    4   44   13   66      328
  7          0    0    1    6   10    3    9    7    6   15       57
  8          0   18  304  111  183   27    6 1075   21   47     1792
  9          2   13  133   26   55    7    7    4  206   15      468
 10          1   10   17   93  122   45   11   68   42  893     1302

---------------------------------------------------------------------
TOTAL        7   82  668  638 1175  328   57 1792  468 1302     6517
PERCENT     .1  1.3 10.3  9.8 18.0  5.0   .9 27.5  7.2 20.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1     2     3     4     5     6     7
             -----------------------------------------
              .2   2.8  22.6  21.6  39.8  11.1   1.9

    PERCENT TEACHER TALK  56.66        PERCENT STEADY STATE  49.33
         PERCENT CONTENT  27.82               TOTAL I/I+D  47.21

        REVISED I/I+D  66.29                  ROW 8 I/I+D  90.70
     ROW 8 - 9 I/I+D  68.05                  ROW 9 I/I+D  91.36

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=28   LANGUAGE ARTS

------------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10       SUM

------------------------------------------------------------------------
  1        2    0    0    1    2    0    0    2    2    0         9
  2        0   26    7   12   10    5    1    7    2    5        75
  3        1    6   64   53   40    4    3   38    4    8       221
  4        3    4    3  111   47    7    2  138   19   58       392
  5        2   11    9   65  592   34    2    9    8   51       783
  6        0    5    1   10   15   87    2   17    3   26       166
  7        0    3    0    4    5    2   12    2    2    5        35
  8        0   13  107   67   23   12    3  471    9   11       716
  9        1    1   25   16    5    1    1    1  122    8       181
 10        0    6    5   53   44   14    9   31   10  180       352

------------------------------------------------------------------------
TOTAL      9   75  221  392  783  166   35  716  181  352      2930
PERCENT   .3  2.6  7.5 13.4 26.7  5.7  1.2 24.4  6.2 12.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1      2      3      4      5      6      7
                  -------------------------------------------------
                   .5    4.5   13.1   23.3   46.6    9.9    2.1

     PERCENT TEACHER TALK  65.21          PERCENT STEADY STATE  56.89
          PERCENT CONTENT  40.10                  TOTAL I/I+D  41.46

           REVISED I/I+D  60.28                    ROW 8 I/I+D  88.89
         ROW 8 - 9 I/I+D  83.64                    ROW 9 I/I+D  93.10

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=28   SOCIAL STUDIES


 ----------------------------------------------------------------------
             1     2     3     4     5     6     7     8     9    10      SUM

 ----------------------------------------------------------------------
   1         1     0     2     0     1     0     0     0     1     0        5

   2         1     8     9     5     3     1     1     0    12     7       47

   3         0    12   127    30    52     5     2     7    85    28      348

   4         1     0     4    54     5     2     1   117    40    30      254

   5         0     4    13    45   430    21     4    14    62    37      630

   6         0     0     2     4    16    47     3     7    10    26      115

   7         0     2     0     3     2     5    28     1     4     4       49

   8         0     2    25    40    25     8     1   102    26    27      256

   9         2    14   158    32    50     3     6     3   440    24      732

  10         0     5     8    41    46    23     3     5    52   534      717


 ----------------------------------------------------------------------
TOTAL        5    47   348   254   630   115    49   256   732   717     3153

PERCENT     .2   1.5  11.0   8.1  20.0   3.6   1.6   8.1  23.2  22.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               -----------------------------------------------
                 .3    3.2   24.0   17.5   43.5    7.9    3.4

     PERCENT TEACHER TALK  59.44        PERCENT STEADY STATE  56.17

          PERCENT CONTENT  28.04                 TOTAL I/I+D  45.17

          REVISED I/I+D  70.92                   ROW 8 I/I+D  75.00

        ROW 8 - 9 I/I+D  74.59                   ROW 9 I/I+D  95.08

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=28   MATH

 ------------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10       SUM

 ------------------------------------------------------------------------
   1         5    0    1    5    3    0    0    1    2    0        17
   2         1   10    3    8   16    0    0    1    1    3        43
   3         2    7   35   44   38    7    0   20   17    8       178
   4         2    1    2  104   30    9    2  160    2   40       352
   5         4    6    6   88  250   21    2   19    5   15       416
   6         0    1    2   10   16   59    0   17    2    7       114
   7         0    0    0    3    2    0    2    3    0    1        11
   8         2   13  105   49   31    8    2  119    7   17       353
   9         1    1   23    5    6    1    2    1   13    0        53
  10         0    4    1   36   24    9    1   12    4   85       176


 ------------------------------------------------------------------------
TOTAL       17   43  178  352  416  114   11  353   53  176      1713
PERCENT    1.0  2.5 10.4 20.5 24.3  6.7   .6 20.6  3.1 10.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
             ----------------------------------------------
               1.5    3.8   15.7   31.1   36.8   10.1    1.0

     PERCENT TEACHER TALK  73.58          PERCENT STEADY STATE  39.81
          PERCENT CONTENT  44.83                  TOTAL I/I+D  52.17

          REVISED I/I+D  65.56                    ROW 8 I/I+D  92.31
         ROW 8 - 9 I/I+D  79.92                   ROW 9 I/I+D  89.29

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=28   COMPOSITE MATRIX

----------------------------------------------------------------------
              1    2    3    4    5    6    7    8    9   10      SUM

----------------------------------------------------------------------
   1          8    0    3    6    6    0    0    3    5    0       31
   2          2   44   22   25   30    6    2    8   15   15      169
   3          3   27  246  135  143   16    5   71  113   44      803
   4          6    5   11  276   86   18    6  432   67  133     1040
   5          6   22   28  210 1389   80    8   45   89  117     1994
   6          0    6    5   25   49  206    5   41   16   71      424
   7          0    5    0   10   11    7   42    6    7   10       98
   8          2   29  253  161   82   28    6  709   43   55     1368
   9          4   16  221   57   71    6   10    5  602   34     1026
  10          0   15   14  135  127   57   14   48   69  841     1320

----------------------------------------------------------------------
TOTAL        31  169  803 1040 1994  424   98 1368 1026 1320     8273
PERCENT      .4  2.0  9.7 12.6 24.1  5.1  1.2 16.5 12.4 16.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
          -----------------------------------------
             .7   3.7  17.6  22.8  43.7   9.3   2.1

      PERCENT TEACHER TALK  65.57        PERCENT STEADY STATE  55.11

           PERCENT CONTENT  36.67                 TOTAL I/I+D  44.81

          REVISED I/I+D  65.77                    ROW 8 I/I+D  89.31

         ROW 8 - 9 I/I+D  78.54                   ROW 9 I/I+D  93.77

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=30   LANGUAGE ARTS

-----------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------
   1         3    0    0    1    4    1    0    0    0    1       10
   2         0    0    4    3    3    2    0    2    3    0       17
   3         3    3   40   36   55    7    2   15   21    7      189
   4         1    0    2   25   15    6    4  181   27   13      274
   5         3    4    8   81  590   29    5   20   36  127      903
   6         0    2    2   13   20   71    4   18   14   31      175
   7         0    0    1    5    3    6    4    2    4    6       31
   8         0    8   77   72   56   17    2  206   11    6      455
   9         0    0   51   26   23   17    8    2  349    3      479
  10         0    0    4   12  134   19    2    9   14  236      430

-----------------------------------------------------------------
TOTAL       10   17  189  274  903  175   31  455  479  430     2963
PERCENT     .3   .6  6.4  9.2 30.5  5.9  1.0 15.4 16.2 14.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                   1     2     3     4     5     6     7
                ----------------------------------------
                  .6   1.1  11.8  17.1  56.5  10.9   1.9

     PERCENT TEACHER TALK  63.13         PERCENT STEADY STATE  51.43
          PERCENT CONTENT  39.72                  TOTAL I/I+D  30.64

          REVISED I/I+D  51.18                   ROW 8 I/I+D  81.73
        ROW 8 - 9 I/I+D  65.55                   ROW 9 I/I+D  67.11

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=30   SOCIAL STUDIES

-------------------------------------------------------------------
             1     2     3     4     5     6     7     8     9    10       SUM

-------------------------------------------------------------------
   1         0     0     0     0     0     0     0     0     0     0         0
   2         0     1     0     1     0     0     0     0     0     0         2
   3         0     0    14    10    10     1     0     1     2     1        39
   4         0     0     0    33     0     0     0    45     3    15        96
   5         0     0     0    25   130     0     0     1     7     0       163
   6         0     0     0     0     1     3     0     0     0     1         5
   7         0     0     0     0     0     0     2     0     1     0         3
   8         0     0    15    18    16     1     0    37     1     3        91
   9         0     1     9     2     1     0     1     0    49     1        64
  10         0     0     1     7     5     0     0     7     1    16        37


-------------------------------------------------------------------
TOTAL        0     2    39    96   163     5     3    91    64    37       500
PERCENT     .0    .4   7.8  19.2  32.6   1.0    .6  18.2  12.8   7.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               ------------------------------------------
                 .0     .6   12.7   31.2   52.9    1.6    1.0

    PERCENT TEACHER TALK  66.52        PERCENT STEADY STATE  57.00
         PERCENT CONTENT  51.80                 TOTAL I/I+D  44.48

         REVISED I/I+D  83.67                   ROW 8 I/I+D  93.75
       ROW 8 - 9 I/I+D  70.31                   ROW 9 I/I+D  90.91

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=30    MATH


 -----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10        SUM

 -----------------------------------------------------------------------
  1        0    0    0    0    1    0    0    0    0    0          1

  2        0    5    7    9   10    3    0    1    1    4         40

  3        0   11   30   35   55    7    0   34   11   10        193

  4        0    0    4   42   20    1    1  180   14   28        290

  5        1    7   15  112  444   31    5   57   29   50        751

  6        0    0    1    7   20   55    2   31    7   22        145

  7        0    1    1    1    4    1    4    2    0    5         19

  8        0    7  102   55  116   21    1  128   10   25        465

  9        0    3   25    6   29    5    1    4   20    4         97

 10        0    6    8   23   52   21    5   28    5  158        306


 -----------------------------------------------------------------------
TOTAL      1   40  193  290  751  145   19  465   97  306       2306

PERCENT   .0  1.7  8.4 12.6 32.6  6.3   .8 20.2  4.2 13.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1     2     3     4     5     6     7
               -----------------------------------------
                 .1   2.8  13.4  20.2  52.2  10.1   1.3

    PERCENT TEACHER TALK  71.91         PERCENT STEADY STATE  38.42

         PERCENT CONTENT  45.14                  TOTAL I/I+D  36.41

         REVISED I/I+D  58.79                   ROW 8 I/I+D  83.21

      ROW 8 - 9 I/I+D  53.37                   ROW 9 I/I+D  82.35

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=30   COMPOSITE MATRIX

 ----------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10     SUM

 ----------------------------------------------------------------
   1        3    0    1    2    6    1    0    0    0    1      14
   2        1    9   12   14   15    7    0    3    4    4      69
   3        4   17  165  115  177   20    4   62   63   24     651
   4        1    0   10  135   44    8    9  499   70   75     851
   5        4   13   30  264 1636   71   17  104  104  214    2457
   6        0    3    4   22   54  164    7   52   27   64     397
   7        1    1    4   15   17    7   23    8    8   17     101
   8        0   15  247  187  211   40    7  502   39   53    1301
   9        0    5  156   43   73   26   17    8  695   17    1040
  10        0    6   22   54  224   53   17   63   30  504     973


 ----------------------------------------------------------------
TOTAL      14   69  651  851 2457  397  101 1301 1040  973    7853
PERCENT    .2   .9  8.3 10.8 31.3  5.1  1.3 16.6 13.2 12.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1     2     3     4     5     6     7
           -----------------------------------------
              .3   1.5  14.3  18.7  54.1   8.7   2.2

    PERCENT TEACHER TALK  65.98        PERCENT STEADY STATE  52.37
         PERCENT CONTENT  42.12                 TOTAL I/I+D  34.91

          REVISED I/I+D  59.58                  ROW 8 I/I+D  84.79
        ROW 8 - 9 I/I+D  63.58                  ROW 9 I/I+D  78.92

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=34   LANGUAGE ARTS

------------------------------------------------------------------
           1     2     3     4     5     6     7     8     9    10      SUM

------------------------------------------------------------------
   1       0     0     0     0     1     0     0     1     0     0        2
   2       0     1     3    21     5    19     0     5     4     2       60
   3       1     7     1    41    24    11     4    32     9    11      141
   4       0     3     0    37    10    17     4   213    12    18      314
   5       0     1     2    31   171    26     1    59     5    52      348
   6       1     0     0    11    12    84     3    97     6    30      244
   7       0     2     0     6     4     5    23    15     6     8       69
   8       0    44   112   133    62    47    18   421    11    17      865
   9       0     1    21    11     9     7     7     6    12    13       87
  10       0     1     2    23    50    28     9    16    22   339      490

------------------------------------------------------------------
TOTAL      2    60   141   314   348   244    69   865    87   490     2620
PERCENT   .1   2.3   5.4  12.0  13.3   9.3   2.6  33.0   3.3  18.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              ------------------------------------------
                .2    5.1   12.0   26.7   29.5   20.7    5.9

      PERCENT TEACHER TALK  55.31        PERCENT STEADY STATE  41.56

           PERCENT CONTENT  25.27                TOTAL I/I+D  43.89

           REVISED I/I+D  39.34                  ROW 8 I/I+D  70.59

         ROW 8 - 9 I/I+D  68.22                  ROW 9 I/I+D  61.11

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=34   SOCIAL STUDIES


-------------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10       SUM

-------------------------------------------------------------------------
   1        0     0     0     0     0     0     0     0     0     0         0
   2        0     0     0     2     3     0     0     3     0     0         8
   3        0     1     6    38    19     6     3    21    30     7       131
   4        0     0     1    67    11     5     3   119    30    27       263
   5        0     0     1    38    77     8     1   110    22    11       268
   6        0     0     0     5     1    30     3    30     6    11        86
   7        0     0     2     4     3     2    16    18    12     6        63
   8        0     6    82    62   116    24    17   967    19    10      1303
   9        0     1    39    21    19     2    15    23   137    12       269
  10        0     0     0    26    19     9     5    12    13    60       144


-------------------------------------------------------------------------
TOTAL       0     8   131   263   268    86    63  1303   269   144      2535
PERCENT    .0    .3   5.2  10.4  10.6   3.4   2.5  51.4  10.6   5.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
           ----------------------------------------------------
               .0    1.0   16.0   32.1   32.7   10.5    7.7

      PERCENT TEACHER TALK  34.25         PERCENT STEADY STATE  53.65
           PERCENT CONTENT  20.95                TOTAL I/I+D  49.08

          REVISED I/I+D  48.26                  ROW 8 I/I+D  68.22
        ROW 8 - 9 I/I+D  52.23                  ROW 9 I/I+D  70.18

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=34   MATH

-----------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10     SUM

-----------------------------------------------------------------
   1        0    0    0    0    0    0    0    0    0    0       0
   2        0    0    0    0    1    0    0    0    0    0       1
   3        0    0    2   15   18    1    0    7    1    2      46
   4        0    0    0   32    5    1    1   63    2    8     112
   5        0    0    1   19   70    1    1   51    2   10     155
   6        0    0    0    0    2    5    0    6    0    2      15
   7        0    0    0    1    2    0    0    2    0    0       5
   8        0    1   42   36   43    4    2  194    7   18     347
   9        0    0    1    0    8    0    1    3   10    1      24
  10        0    0    0    9    6    3    0   21    2   32      73


-----------------------------------------------------------------
TOTAL       0    1   46  112  155   15    5  347   24   73     778
PERCENT    .0   .1  5.9 14.4 19.9  1.9   .6 44.6  3.1  9.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
           ----------------------------------------
             .0    .3  13.8  33.5  46.4   4.5   1.5

    PERCENT TEACHER TALK  47.38       PERCENT STEADY STATE  44.34
         PERCENT CONTENT  34.32               TOTAL I/I+D  47.60

         REVISED I/I+D  70.15                ROW 8 I/I+D  87.76
         ROW 8 - 9 I/I+D  57.97              ROW 9 I/I+D  50.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=34   COMPOSITE MATRIX


-----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10       SUM

-----------------------------------------------------------------------
   1       0    0    0    0    1    0    0    1    0    0         2

   2       0    3    3   23   10   19    0    8    6    2        74

   3       1    8   12   97   62   19    7   61   45   26       338

   4       0    3    1  137   26   23    8  416   45   54       713

   5       0    2    4   89  349   40    4  221   32   77       818

   6       1    0    0   20   17  150   11  133   17   50       399

   7       0    2    2   12    9    9   57   35   19   24       169

   8       0   51  243  236  222   80   38 1585   39   48      2542

   9       0    4   71   33   45    9   24   32  168   30       414

  10       0    1    2   66   79   50   20   50   43  537       848


-----------------------------------------------------------------------
TOTAL      2   74  338  713  818  399  169 2542  414  848      6317

PERCENT   .0  1.2  5.4 11.3 12.9  6.3  2.7 40.2  6.6 13.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

               1      2      3      4      5      6      7
           ------------------------------------------------
              .1    2.9   13.5   28.4   32.6   15.9    6.7

     PERCENT TEACHER TALK  45.95       PERCENT STEADY STATE  52.92

           PERCENT CONTENT  24.24                 TOTAL I/I+D  44.85

           REVISED I/I+D  42.16                 ROW 8 I/I+D  71.36

         ROW 8 - 9 I/I+D  60.53                 ROW 9 I/I+D  69.44

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=37   LANGUAGE ARTS

 ------------------------------------------------------------------------
               1    2    3    4    5    6    7    8    9   10       SUM


 ------------------------------------------------------------------------
   1           0    0    0    0    0    1    0    0    0    0         1
   2           0    1    1    4    7    3    0    0    0    1        17
   3           0    2   34   80   50   18    1   20    4   18       227
   4           0    1    5   77   15    7    1  317   10   42       475
   5           0    1    0   89  196   46    2  176   11   35       556
   6           0    0    0   21   29  105    2   71    0   53       281
   7           0    0    1    3    1    3    3    4    0    3        18
   8           0   12  149  141  206   62    5 1735   10   62      2382
   9           0    0   25    6    4    2    0    3   47    1        88
  10           1    0   12   54   48   34    4   56    6  177       392


 ------------------------------------------------------------------------
TOTAL          1   17  227  475  556  281   18 2382   88  392      4437
PERCENT       .0   .4  5.1 10.7 12.5  6.3   .4 53.7  2.0  8.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1      2      3      4      5      6      7
                 ---------------------------------------------
                   .1    1.1   14.4   30.2   35.3   17.8    1.1

   PERCENT TEACHER TALK  38.94         PERCENT STEADY STATE  53.53
          PERCENT CONTENT  23.24                  TOTAL I/I+D  45.71

           REVISED I/I+D  45.04                  ROW 8 I/I+D  70.61
         ROW 8 - 9 I/I+D  54.41                  ROW 9 I/I+D  92.59

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=37   SOCIAL STUDIES


-----------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10      SUM


-----------------------------------------------------------------
   1      0    0    0    0    0    0    0    0    0    0        0

   2      0    1    1    0    2    0    0    0    0    0        4

   3      0    0   16   19   22    4    2   19   13    1       96

   4      0    0    1    6    6    2    0   85   14   11      125

   5      0    2    0   35  102   15    0   30    7   10      201

   6      0    0    0    3   12   18    1   17    1   20       72

   7      0    0    1    1    1    0    0    2    0    2        7

   8      0    1   47   45   42   18    3  648    3    7      814

   9      0    0   27    4    2    3    0    1   54    3       94

  10      0    0    3   12   12   12    1   12    2   54      108


-----------------------------------------------------------------
TOTAL     0    4   96  125  201   72    7  814   94  108     1521

PERCENT  .0   .3  6.3  8.2 13.2  4.7   .5 53.5  6.2  7.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1     2     3     4     5     6     7
            -------------------------------------------
                .0    .8  19.0  24.8  39.8  14.3   1.4

    PERCENT TEACHER TALK  35.74        PERCENT STEADY STATE  59.11

         PERCENT CONTENT  21.43                TOTAL I/I+D  44.55

           REVISED I/I+D  55.87                ROW 8 I/I+D  69.57

         ROW 8 - 9 I/I+D  64.58                ROW 9 I/I+D  90.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=37   MATH

--------------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10        SUM

--------------------------------------------------------------------------
   1        0    0    0    0    0    0    0    0    0    0          0
   2        0    0    0    0    0    0    0    0    0    0          0
   3        0    0    5    5    8    2    0    0    2    1         23
   4        0    0    0    3    4    0    1   33    0    7         48
   5        0    0    0   22   97    8    2    7    2    3        141
   6        0    0    0    1    8   10    0    1    0    5         25
   7        0    0    0    0    1    1    3    0    0    2          7
   8        0    0   13   12   14    3    0   10    1    3         56
   9        0    0    5    0    0    0    0    0    3    0          8
  10        0    0    0    5    9    1    1    5    0    8         29

--------------------------------------------------------------------------
TOTAL       0    0   23   48  141   25    7   56    8   29        337
PERCENT    .0   .0  6.8 14.2 41.8  7.4  2.1 16.6  2.4  8.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
                 ---------------------------------------------
                 .0     .0    9.4   19.7   57.8   10.2    2.9

    PERCENT TEACHER TALK  79.22        PERCENT STEADY STATE  41.25
         PERCENT CONTENT  56.08              TOTAL I/I+D  29.10

        REVISED I/I+D  41.82                 ROW 8 I/I+D  81.25
      ROW 8 - 9 I/I+D  63.83                 ROW 9 I/I+D 100.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=37   COMPOSITE MATRIX


-----------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------
  1       0    0    0    0    0    1    0    0    0    0        1

  2       0    2    2    4    9    3    0    0    0    1       21

  3       0    2   55  104   80   24    3   39   19   20      346

  4       0    1    6   86   25    9    2  437   24   60      650

  5       0    3    0  147  402   72    4  213   20   50      911

  6       0    0    0   26   53  134    3   89    1   79      385

  7       0    0    2    4    3    4    6    6    0    7       32

  8       0   13  209  198  263   83    8 2393   14   73     3254

  9       0    0   57   10    6    5    0    4  104    4      190

 10       1    0   15   71   70   50    6   73    8  240      534


-----------------------------------------------------------------
TOTAL     1   21  346  650  911  385   32 3254  190  534     6324

PERCENT  .0   .3  5.5 10.3 14.4  6.1   .5 51.5  3.0  8.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
            1     2     3     4     5     6     7
         ------------------------------------------
           .0    .9  14.7  27.7  38.8  16.4   1.4

    PERCENT TEACHER TALK  40.52        PERCENT STEADY STATE  56.31

         PERCENT CONTENT  24.68                TOTAL I/I+D  43.39

         REVISED I/I+D  46.88                  ROW 8 I/I+D  70.93

       ROW 8 - 9 I/I+D  57.16                  ROW 9 I/I+D  91.94

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=40   LANGUAGE ARTS

-------------------------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10         SUM

-------------------------------------------------------------------------------
 1        0    0    0    0    0    0    0    0    0    0           0
 2        0    0    0    0    3    0    0    0    0    0           3
 3        0    0    9   24   27    5    2   17    7   15         106
 4        0    0    0    7    6    2    0   84    6   20         125
 5        0    0    1   28  322   13    0   50   13   15         442
 6        0    0    0    2   12   15    0    6    7   11          53
 7        0    0    0    0    1    0    6    0    0    3          10
 8        0    3   64   41   45    5    0   93    4    9         264
 9        0    0   30    6    2    2    0    1    8    1          50
10        0    0    2   17   24   11    2   13    5   64         138

-------------------------------------------------------------------------------
TOTAL     0    3  106  125  442   53   10  264   50  138        1191
PERCENT  .0   .3  8.9 10.5 37.1  4.5   .8 22.2  4.2 11.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
             1      2      3      4      5      6      7
            ---------------------------------------------
            .0     .4   14.3   16.9   59.8    7.2    1.4

    PERCENT TEACHER TALK  70.18          PERCENT STEADY STATE  44.00

         PERCENT CONTENT  47.61                  TOTAL I/I+D  31.66

           REVISED I/I+D  63.37                  ROW 8 I/I+D  93.06

       ROW 8 - 9 I/I+D  72.73                    ROW 9 I/I+D  93.75

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=40   SOCIAL STUDIES


--------------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10      SUM


--------------------------------------------------------------------
  1       0    0    0    0    0    0    0    0    0    0        0

  2       0    0    0    1    0    1    0    0    1    0        3

  3       0    1   59   50   45    2    1   37   58   10      263

  4       0    0    4   67   12    0    3  139   31   42      298

  5       0    0    2   40  587   11    0   70   27   20      757

  6       0    0    0    2    4    3    1   12    4    3       29

  7       0    0    0    0    1    3    5    4    6    7       26

  8       0    1  107   70   64    6    5  910   14   24     1201

  9       0    1   82   23   16    1    6    9  191   12      341

 10       0    0    9   45   28    2    5   20    9   47      165



--------------------------------------------------------------------
TOTAL     0    3  263  298  757   29   26 1201  341  165     3082

PERCENT  .0   .1  8.5  9.7 24.6   .9   .8 39.0 11.1  5.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

              1     2     3     4     5     6     7
           -----------------------------------------
             .0    .2  19.1  21.7  55.0   2.1   1.9


   PERCENT TEACHER TALK  47.16        PERCENT STEADY STATE  60.64

       PERCENT CONTENT  34.23                 TOTAL I/I+D  40.99

         REVISED I/I+D  82.87                 ROW 8 I/I+D  90.76

       ROW 8 - 9 I/I+D  74.35                 ROW 9 I/I+D  92.22

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=40   MATH

-----------------------------------------------------------------------
         1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------------
 1       0    0    0    0    0    0    0    0    0    0        0
 2       0    0    0    0    3    1    0    1    2    0        7
 3       0    2   19   24   42   11    4   17   18   13      150
 4       0    1    0   29    9    1    1  156    5   50      252
 5       0    1    1   76  299   21    4   36   19   22      479
 6       0    0    0    6   18   17    4    9    9   12       75
 7       0    0    0    3    4    6   20    1   10    4       48
 8       0    2   73   84   62   10    4   81    5   26      347
 9       0    1   52    5   14    2    2    2   36    2      116
10       0    0    5   25   28    6    9   44   12  122      251

-----------------------------------------------------------------------
TOTAL    0    7  150  252  479   75   48  347  116  251     1725
PERCENT .0   .4  8.7 14.6 27.8  4.3  2.8 20.1  6.7 14.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
           ------------------------------------------
             .0    .7  14.8  24.9  47.4   7.4   4.7

   PERCENT TEACHER TALK  68.59        PERCENT STEADY STATE  36.12

        PERCENT CONTENT  42.38                TOTAL I/I+D  40.45

         REVISED I/I+D  56.07                 ROW 8 I/I+D  84.27

       ROW 8 - 9 I/I+D  69.77                 ROW 9 I/I+D  92.98

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=40   COMPOSITE MATRIX


----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

----------------------------------------------------------------------
   1       0    0    0    0    0    0    0    0    0    0        0

   2       0    0    0    1    6    2    0    1    3    0       13

   3       0    3  118  113  131   20   10   80  103   44      622

   4       0    1    4  142   35    3    4  438   46  118      791

   5       0    1    4  157 1264   47    6  194   86   60     1819

   6       0    0    0   10   35   43    7   28   23   33      179

   7       0    0    0    4    9   12   65    7   23   20      140

   8       0    6  274  236  198   22   12 1389   39   64     2240

   9       0    2  205   40   50    6   13   22  371   25      734

  10       0    0   17   88   91   24   23   81   40  282      646


----------------------------------------------------------------------
TOTAL      0   13  622  791 1819  179  140 2240  734  646     7183

PERCENT   .0   .2  8.7 11.0 25.3  2.5  1.9 31.2 10.2  9.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

                 1     2     3     4     5     6     7
             ------------------------------------------
                .0    .4  17.5  22.2  51.0   5.0   3.9

     PERCENT TEACHER TALK  54.51        PERCENT STEADY STATE  58.83

          PERCENT CONTENT  36.34                TOTAL I/I+D  40.01

           REVISED I/I+D  66.56                 ROW 8 I/I+D  89.17

        ROW 8 - 9 I/I+D  71.71                  ROW 9 I/I+D  91.59

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=42   LANGUAGE ARTS

---------------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10        SUM

---------------------------------------------------------------------
  1       3    0    0    0    0    1    0    1    0    1          6
  2       0    1    1    3    2    1    0    1    4    2         15
  3       0    2    3   25   51    9    9    5   17   22        143
  4       1    1    0   24   11    2    1  150   16   15        221
  5       1    1    2   59  282   15    7   20   44  125        556
  6       0    0    0   10   14   90    7    5    3   27        156
  7       0    0    1    8   10    6   35    5    9   12         86
  8       1    5   48   52   48    6    6   29    7   22        224
  9       0    4   85   11   28    3    2    0   39   17        189
 10       0    1    3   29  110   23   19    8   50  403        646


---------------------------------------------------------------------
TOTAL     6   15  143  221  556  156   86  224  189  646       2242
PERCENT  .3   .7  6.4  9.9 24.8  7.0  3.8 10.0  8.4 28.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
          -----------------------------------------
             .5   1.3  12.1  18.7  47.0  13.2   7.3

    PERCENT TEACHER TALK  74.12        PERCENT STEADY STATE  40.54
         PERCENT CONTENT  34.66               TOTAL I/I+D  32.54

          REVISED I/I+D  40.39                ROW 8 I/I+D  81.82
        ROW 8 - 9 I/I+D  68.90                ROW 9 I/I+D  94.68

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=42   SOCIAL STUDIES

-----------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10      SUM

-----------------------------------------------------------------------
    1       3     0     0     1     0     0     0     2     1     0        7
    2       0     0     0     2     0     0     0     1     0     2        5
    3       1     1    12    27    33     1     0     4     1    14       94
    4       0     0     1    21    15     1     0    85     8     4      135
    5       2     1     1    36   288    11     4    38    24    38      443
    6       0     0     0     3     8    12     0     0     3    10       36
    7       0     0     0     6     2     1    13     2     1     5       30
    8       0     3    57    16    49     3     2   352     4     6      492
    9       0     0    23     4    17     0     3     0    28     6       81
   10       1     0     0    19    31     7     8     8    11   155      240


-----------------------------------------------------------------------
TOTAL       7     5    94   135   443    36    30   492    81   240     1563
PERCENT    .4    .3   6.0   8.6  28.3   2.3   1.9  31.5   5.2  15.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1       2       3       4       5       6       7
            ------------------------------------------------------
              .9      .7    12.5    18.0    59.1     4.8     4.0

      PERCENT TEACHER TALK  56.69          PERCENT STEADY STATE  56.56
           PERCENT CONTENT  36.98                   TOTAL I/I+D  32.13

           REVISED I/I+D  61.63                   ROW 8 I/I+D  92.31
         ROW 8 - 9 I/I+D  58.19                   ROW 9 I/I+D  88.46

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
TERACTION ANALYSIS

ACHER NUMBER=42   MATH

-----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------------
  1        2    0    0    2    1    1    1    0    0    1        8
  2        0    0    0    0    0    0    0    0    0    0        0
  3        2    0    8   16   17    4    4    3    4   18       76
  4        1    0    2    3    6    0    2   59    2    7       82
  5        0    0    0   17  123   11    2    6    9   20      188
  6        0    0    0    3   16   34    2    0    2   13       70
  7        1    0    0    5    1    1   11    1    6    3       29
  8        1    0   37   17    6    2    1    6    4    6       80
  9        0    0   25    3    4    1    2    0   16    5       56
 10        1    0    4   16   14   16    4    5   13  169      242

-----------------------------------------------------------------------
TOTAL      8    0   76   82  188   70   29   80   56  242      831
PERCENT  1.0   .0  9.1  9.9 22.6  8.4  3.5  9.6  6.7 29.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               ------------------------------------------------
                1.8     .0   16.8   18.1   41.5   15.5    6.4

    PERCENT TEACHER TALK  76.91          PERCENT STEADY STATE  44.77

         PERCENT CONTENT  32.49                   TOTAL I/I+D  36.64

         REVISED I/I+D  45.90                     ROW 8 I/I+D  92.68

         ROW 8 - 9 I/I+D  83.84                   ROW 9 I/I+D  89.29

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=42   COMPOSITE MATRIX


------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10     SUM

------------------------------------------------------------------
  1        9    0    0    4    4    3    1    3    1    3      28

  2        0    3    1    6    3    2    0    2    5    9      31

  3        3    3   33   76  125   21   17   17   43   75     413

  4        3    1    4   54   43    6    4  363   35   29     542

  5        6    4    3  139 1028   48   19  109  113  230    1699

  6        0    1    0   18   45  154   12    8   16   72     326

  7        1    0    1   22   20   11   72    8   20   27     182

  8        2   10  160  111  159   14   10  411   23   42     942

  9        1    6  203   30   69    6    9    0  178   41     543

 10        3    3    8   82  203   61   38   21  109  883    1411


------------------------------------------------------------------
TOTAL     28   31  413  542 1699  326  182  942  543 1411    6117

PERCENT   .5   .5  6.8  8.9 27.8  5.3  3.0 15.4  8.9 23.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1     2     3     4     5     6     7
             ------------------------------------------
               .9   1.0  12.8  16.8  52.7  10.1   5.7

    PERCENT TEACHER TALK  68.44       PERCENT STEADY STATE  52.26

         PERCENT CONTENT  36.64               TOTAL I/I+D  31.48.

        REVISED I/I+D  48.16                  ROW 8 I/I+D  87.76

     ROW 8 - 9 I/I+D  66.20                   ROW 9 I/I+D  93.33

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=48   LANGUAGE ARTS


 ------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10     SUM


 ------------------------------------------------------------------
    1        0    0    0    0    0    0    0    0    0    0       0

    2        0    3    2    1   12    0    0    2    9    4      33

    3        0    5   34   26   46    2    4   18   44   16     195

    4        0    0    0   64   15    2    4  182   28   36     331

    5        0   11    6   86  432   27    9   76   36   79     762

    6        0    2    0    0   16   29    2    8    3   30      90

    7        0    0    0    5   15    0   37    7   14   17      95

    8        0    6   57   89  105    7   12  466   29   30     801

    9        0    6   95   22   40    6   12   11  377   18     587

   10        0    0    1   38   81   17   15   31   47  440     670


 ------------------------------------------------------------------
TOTAL        0   33  195  331  762   90   95  801  587  670    3564

PERCENT     .0   .9  5.5  9.3 21.4  2.5  2.7 22.5 16.5 18.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                     1      2      3      4      5      6      7
                 -------------------------------------------
                    .0    2.2   12.9   22.0   50.6    6.0    6.3

    PERCENT TEACHER TALK  52.04         PERCENT STEADY STATE  52.81

          PERCENT CONTENT  30.67                  TOTAL I/I+D  37.12

            REVISED I/I+D  55.21                  ROW 8 I/I+D  76.83

         ROW 8 - 9 I/I+D  60.18                   ROW 9 I/I+D  84.87

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=48   SOCIAL STUDIES

--------------------------------------------------------------------------
              1    2    3    4    5    6    7    8    9   10       SUM

--------------------------------------------------------------------------
   1          0    0    0    0    0    0    0    0    0    0         0

   2          0    0    0    0    0    0    0    0    1    1         2

   3          0    1    5    6    8    1    0    5    8    4        38

   4          0    0    0   40    0    1    0   59    8   11       119

   5          0    0    1   20  101    8    5   14   11   18       178

   6          0    0    0    5    6   21    1    4    6   13        56

   7          0    0    0    5    8    1   11    8    2    3        38

   8          0    0   19   20   28    6   11  588   33   42       747

   9          0    1   13    9   13    7    3   30   81   14       171

  10          0    0    0   14   14   11    7   39   21  115       221


--------------------------------------------------------------------------
TOTAL         0    2   38  119  178   56   38  747  171  221      1569

PERCENT      .0   .1  2.4  7.6 11.3  3.6  2.4 47.6 10.9 14.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              ------------------------------------------------
                .0     .5    8.8   27.6   41.3   13.0    8.8

     PERCENT TEACHER TALK  31.95          PERCENT STEADY STATE  61.31

          PERCENT CONTENT  18.93                  TOTAL I/I+D  36.89

          REVISED I/I+D  29.85                    ROW 8 I/I+D  52.78

        ROW 8 - 9 I/I+D  47.69                    ROW 9 I/I+D  58.33

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=48   MATH

-----------------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------------
 1        0    0    0    0    0    0    0    0    0    0        0
 2        0    0    1    0    2    0    0    0    1    0        4
 3        0    1   31    5    8    2    1   11   21   16       96
 4        0    0    0   21    7    3    2  104    2   22      161
 5        0    0    0   50  191   14    1   31   11   28      326
 6        0    0    0    6   12   22    1   17    2   18       78
 7        0    0    1    0    3    2    4    8    5   13       36
 8        0    2   16   50   54   14    6  243   12   47      444
 9        0    0   46    3   10    1    6    1   51   14      132
10        0    1    1   26   39   20   15   29   27  413      571

-----------------------------------------------------------------------
TOTAL     0    4   96  161  326   78   36  444  132  571     1848
PERCENT  .0   .2  5.2  8.7 17.6  4.2  1.9 24.0  7.1 30.9

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
             1      2      3      4      5      6      7
           -------------------------------------------------
            .0     .6   13.7   23.0   46.5   11.1    5.1

    PERCENT TEACHER TALK  54.89        PERCENT STEADY STATE  52.81
         PERCENT CONTENT  26.35               TOTAL I/I+D  37.23

        REVISED I/I+D  46.73                  ROW 8 I/I+D  47.37
       ROW 8 - 9 I/I+D  56.25                 ROW 9 I/I+D  86.79

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=48   COMPOSITE MATRIX

-------------------------------------------------------------------------
              1     2     3     4     5     6     7     8     9    10       SUM

-------------------------------------------------------------------------
   1          0     0     0     0     0     0     0     0     0     0         0

   2          0     3     3     1    14     0     0     2    11     5        39

   3          0     7    70    37    62     5     5    34    74    37       331

   4          0     0     0   125    22     6     6   345    38    69       611

   5          0    11     7   156   735    50    15   122    58   126      1280

   6          0     2     0    11    35    80     5    29    11    68       241

   7          0     0     1    10    26     3    54    23    22    38       177

   8          0     8    92   159   187    27    29  1297    74   120      1993

   9          0     7   156    34    63    14    21    42   510    48       895

  10          0     1     2    78   136    56     2    99    97   999      1510


-------------------------------------------------------------------------
TOTAL         0    39   331   611  1280   241   177  1993   895  1510      7076

PERCENT      .0    .6   4.7   8.6  18.1   3.4   2.5  28.2  12.6  21.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
             ------------------------------------------------
               .0    1.5   12.4   22.8   47.8    9.0    6.6

     PERCENT TEACHER TALK  48.12          PERCENT STEADY STATE  68.53

          PERCENT CONTENT  26.72                  TOTAL I/I+D  36.62

          REVISED I/I+D  46.95                    ROW 8 I/I+D  64.10

        ROW 8 - 9 I/I+D  57.21                    ROW 9 I/I+D  82.32

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=50   LANGUAGE ARTS

-------------------------------------------------------------------------
              1     2     3     4     5     6     7     8     9    10      SUM

-------------------------------------------------------------------------
  1           1     0     0     2     5     1     0     0     2     1       12
  2           1     3     1     2     5     1     0     0     0     3       16
  3           0     1     7    16    10     1     0     2    12     5       54
  4           1     2     0    10     5     3     0    74    14     4      113
  5           5     3     2    39   202     8     1     0     5    35      300
  6           0     0     1     3    11     2     0     0     1     8       26
  7           0     0     0     0     2     0     0     0     1     2        5
  8           1     5    23    22    18     1     0     9     5     5       89
  9           1     0    19    11     7     1     1     2    37     2       81
 10           2     2     1     8    35     8     3     2     4    63      128

-------------------------------------------------------------------------
TOTAL        12    16    54   113   300    26     5    89    81   128      824
PERCENT     1.5   1.9   6.6  13.7  36.4   3.2    .6  10.8   9.8  15.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
              ---------------------------------------------------
                2.3    3.0   10.3   21.5   57.0    4.9    1.0

    PERCENT TEACHER TALK  75.57          PERCENT STEADY STATE  40.53

         PERCENT CONTENT  50.12                   TOTAL I/I+D  37.07

          REVISED I/I+D   72.57                   ROW 8 I/I+D  96.67

       ROW 8 - 9 I/I+D    74.55                   ROW 9 I/I+D  90.91

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

INTERACTION ANALYSIS

TEACHER NUMBER=50   SOCIAL STUDIES

	1	2	3	4	5	6	7	8	9	10	SUM
1	0	0	1	2	3	1	0	1	4	3	15
2	0	0	1	2	5	1	0	2	5	1	17
3	1	2	58	37	63	5	0	20	62	9	257
4	2	0	2	51	10	7	2	172	48	24	318
5	3	3	9	72	471	47	6	66	42	57	776
6	0	0	1	15	32	18	1	21	0	17	105
7	0	0	0	2	8	0	3	1	3	4	21
8	4	6	59	98	89	15	2	236	10	23	542
9	5	5	123	12	25	3	1	1	291	6	472
10	0	1	3	27	71	9	6	22	7	92	238
TOTAL	15	17	257	318	776	105	21	542	472	238	2761
PERCENT	.5	.6	9.3	11.5	28.1	3.8	.8	19.6	17.1	8.6	

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

1	2	3	4	5	6	7
1.0	1.1	17.0	21.1	51.4	7.0	1.4

PERCENT TEACHER TALK 59.81

PERCENT STEADY STATE 44.19

PERCENT CONTENT 39.62

TOTAL I/I+D 40.23

REVISED I/I+D 69.64

ROW 8 I/I+D 80.23

ROW 8 - 9 I/I+D 69.80

ROW 9 I/I+D 97.08

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100. I.E. PERCENTS.

```
 INTERACTION ANALYSIS

TEACHER NUMBER=50   MATH

------------------------------------------------------------------------
              1    2    3    4    5    6    7    8    9   10      SUM

------------------------------------------------------------------------
   1          2    0    0    2    7    1    0    1    1    1       15
   2          0    0    3   11   10    3    0    1    1    6       35
   3          1    2   22   60   48    8    2   21   23   13      200
   4          1    1    3   61   25    1    1  310   11   28      442
   5          4    5    3  135  459   17    0   31   15   24      693
   6          0    0    0    5   16    5    0    4    4   18       52
   7          0    3    0    3    4    0    1    1    1    1       14
   8          4   19  118  129   88    4    5   66   11   33      477
   9          0    4   49    9    6    1    1    2   35    7      114
  10          3    1    2   27   30   12    4   40   12   67      198


------------------------------------------------------------------------
TOTAL        15   35  200  442  693   52   14  477  114  198     2240
PERCENT      .7  1.6  8.9 19.7 30.9  2.3   .6 21.3  5.1  8.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1     2     3     4     5     6     7
                ------------------------------------------
                 1.0   2.4  13.8  30.5  47.8   3.6   1.0

    PERCENT TEACHER TALK  71.06          PERCENT STEADY STATE  32.05
         PERCENT CONTENT  50.67                  TOTAL I/I+D  47.69

          REVISED I/I+D  79.11                  ROW 8 I/I+D  94.00
      ROW 8 - 9 I/I+D  75.97                  ROW 9 I/I+D  96.36

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=50   COMPOSITE MATRIX


------------------------------------------------------------------------------
             1     2     3     4     5     6     7     8     9    10       SUM

------------------------------------------------------------------------------
   1         3     0     1     6    15     3     0     2     7     5        42
   2         1     6     7    19    26     6     0     5    11    14        95
   3         2     8   112   123   159    15     3    49   128    33       632
   4         4     3     5   136    50    14     3   617    94    57       983
   5        12    21    20   285  1571    80     9   115    95   140      2348
   6         0     0     2    25    70    26     2    26     6    51       208
   7         0     3     1     5    15     2     6     3     7     9        51
   8         9    37   222   271   222    20     8   365    33    64      1251
   9         6    12   255    42    60    10     5     5   507    17       919
  10         5     5     7    71   161    33    15    64    31   279       671


------------------------------------------------------------------------------
TOTAL       42    95   632   983  2348   208    51  1251   919   671      7200
PERCENT     .6   1.3   8.8  13.7  32.6   2.9    .7  17.4  12.8   9.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1       2       3       4       5       6       7
           ------------------------------------------------------
             1.0     2.2    14.5    22.6    53.9     4.8     1.2

     PERCENT TEACHER TALK  66.76          PERCENT STEADY STATE  50.79
          PERCENT CONTENT  46.26                 TOTAL I/I+D  40.19

           REVISED I/I+D  74.81                 ROW 8 I/I+D  90.54
        ROW 8 - 9 I/I+D  72.43                 ROW 9 I/I+D  94.79

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=51   LANGUAGE ARTS

-----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

-- --------------------------------------------------------------------
  1        0    0    0    0    0    0    0    1    0    0        1
  2        0    2    3    4    3    3    0    0    2    1       18
  3        0    3   73   31   50    8    7   22   51   23      268
  4        0    0    2   32   12    6    3  137   46   18      256
  5        1    1    3   81  618   69    9   50   42   40      914
  6        0    0    0    9   62   69    5   19    6   24      194
  7        0    0    2    3   14    5   24    5    4    9       66
  8        0    7   47   57   92   10    7  642   14   23      899
  9        0    4  135    9   17    6    4    2  158   13      348
 10        0    1    3   30   46   18    7   21   25  197      348


-----------------------------------------------------------------------
TOTAL      1   18  268  256  914  194   66  899  348  348     3312
PERCENT   .0   .5  8.1  7.7 27.6  5.9  2.0 27.1 10.5 10.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
          ------------------------------------------
             .1   1.0  15.6  14.9  53.2  11.3   3.8

    PERCENT TEACHER TALK  57.93          PERCENT STEADY STATE  54.80
         PERCENT CONTENT  35.33                  TOTAL I/I+D  31.62

         REVISED I/I+D  52.47                    ROW 8 I/I+D  76.06
       ROW 8 - 9 I/I+D  65.57                    ROW 9 I/I+D  93.29

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=51   SOCIAL STUDIES

 ----------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10        SUM

 ----------------------------------------------------------------------
  1         0    0    0    0    0    0    0    0    0    0          0
  2         0    3    2    0    5    1    0    0    2    1         14
  3         0    2   30   13   24    1    1    3   37   12        123
  4         0    0    0   12    4    1    1   89   10   16        133
  5         0    0    2   30  325   13    4    6   14   47        441
  6         0    0    0    7   14   21    0    2    3    6          5
  7         0    0    1    1    5    2   13    3    3    3         31
  8         0    4   14   37   24    3    6   23   10    9        130
  9         0    2   71    7    6    0    3    0  177    4        270
 10         0    3    3   26   34   11    3    4   14  107        205


 ----------------------------------------------------------------------
TOTAL       0   14  123  133  441   53   31  130  270  205       1400
PERCENT    .0  1.0  8.8  9.5 31.5  3.8  2.2  9.3 19.3 14.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               -------------------------------------------------
                 .0    1.8   15.5   16.7   55.5    6.7    3.9

     PERCENT TEACHER TALK  66.53        PERCENT STEADY STATE  50.79
          PERCENT CONTENT  41.00               TOTAL I/I+D  33.96

           REVISED I/I+D  61.99                ROW 8 I/I+D  66.67
        ROW 8 - 9 I/I+D  76.27                 ROW 9 I/I+D  96.05

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=51   MATH

-------------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10        SUM

-------------------------------------------------------------------------
  1         0    0    0    2    1    0    1    0    0    1          5
  2         0    0    2    3    7    2    0    0    1    2         17
  3         0    3   28   18   33    6    0   17   19   14        138
  4         0    0    1   59   19    4    1  148   14   35        281
  5         0    2    0   69  327   36    3   20   38   48        543
  6         1    1    0   14   31   35    3    9    7   18        119
  7         0    0    0    1    4    4   23    1    4    5         42
  8         0   10   44   69   63   16    1  145    6   14        368
  9         0    1   60   10   16    7    4    1   42    4        145
 10         4    0    3   36   42    9    6   27   14  117        258


-------------------------------------------------------------------------
TOTAL       5   17  138  281  543  119   42  368  145  258       1916
PERCENT    .3   .9  7.2 14.7 28.3  6.2  2.2 19.2  7.6 13.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               ---------------------------------------------------
                 .4    1.5   12.1   24.5   47.4   10.4    3.7

    PERCENT TEACHER TALK  69.06        PERCENT STEADY STATE  40.50

         PERCENT CONTENT  43.01                TOTAL I/I+D  38.52

          REVISED I/I+D  49.84                 ROW 8 I/I+D  76.06

       ROW 8 - 9 I/I+D  64.45                  ROW 9 I/I+D  84.72

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=51   COMPOSITE MATRIX

-----------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10       SUM

-----------------------------------------------------------------------
   1        0    0    0    2    2    0    1    1    0    1         7
   2        0    5   10   16   19    6    1    1    7    6        71
   3        0    9  169   74  135   17   11   60  146   69       690
   4        0    1    4  154   47   11    8  465   89   86       865
   5        1    8    9  227 1699  138   22   90  140  179      2513
   6        1    1    0   33  120  145   10   33   24   62       429
   7        0    0    3   10   28   15   85   11   16   30       198
   8        0   27  136  204  217   32   17  968   35   55      1691
   9        0   14  347   31   72   15   12    4  638   35      1168
  10        5    6   12  113  175   50   31   58   73  659      1182


-----------------------------------------------------------------------
TOTAL       7   71  690  865 2513  429  198 1691 1168 1182      8814
PERCENT    .1   .8  7.8  9.8 28.5  4.9  2.2 19.2 13.3 13.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1      2      3      4      5      6      7
           ----------------------------------------------
             .1    1.5   14.5   18.1   52.7    9.0    4.1

     PERCENT TEACHER TALK  62.54        PERCENT STEADY STATE  62.32
           PERCENT CONTENT  38.33                TOTAL I/I+D  34.21

           REVISED I/I+D  55.05                  ROW 8 I/I+D  76.89
         ROW 8 - 9 I/I+D  67.53                  ROW 9 I/I+D  93.04

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=53   LANGUAGE ARTS

-------------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10      SUM

-------------------------------------------------------------------------
  1         0     0     0     0     0     0     0     0     0     0        0
  2         0     0     0     1     1     1     0     1     1     0        5
  3         0     0     7     3    13     1     0     4     3     3       34
  4         0     0     0    11     5     1     0    68     2    13      100
  5         0     1     0    37   205    22     3    16     4    27      315
  6         0     0     0     9    22    46     1     2     0    23      103
  7         0     0     0     1     0     1     4     2     2    11       21
  8         0     2    18    29    38    10     3   124     1    13      238
  9         0     0     9     1     4     1     1     1     4     1       22
 10         0     2     0     8    27    20     9    20     5    72      163


-------------------------------------------------------------------------
TOTAL       0     5    34   100   315   103    21   238    22   163     1001
PERCENT    .0    .5   3.4  10.0  31.5  10.3   2.1  23.8   2.2  16.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                       1      2      3      4      5      6      7
                     ----------------------------------------------
                      .0     .9    5.9   17.3   54.5   17.8    3.6

     PERCENT TEACHER TALK  68.97        PERCENT STEADY STATE  47.25
          PERCENT CONTENT  41.46                TOTAL I/I+D  24.05

          REVISED I/I+D  23.93                  ROW 8 I/I+D  60.61
        ROW 8 - 9 I/I+D  50.86                  ROW 9 I/I+D  81.82

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=53   SOCIAL STUDIES


-----------------------------------------------------------------------
           1     2     3     4     5     6     7     8     9    10      SUM

-----------------------------------------------------------------------
  1        0     0     0     0     0     0     0     0     0     0        0

  2        0     2     0     3     0     1     0     0     0     0        6

  3        0     1    25    13    27     1     0     9     8     3       87

  4        0     0     0    22     7     3     0   124     3    17      176

  5        0     1     1    72   500    20     8    14    11    32      659

  6        0     0     0     7    18    13     0     2     1    12       53

  7        0     0     1     2     6     0     6     8     1     4       28

  8        0     1    38    48    54     6     7    68     3    15      240

  9        0     0    21     1     6     0     1     1    44     2       76

 10        0     1     1     8    41     9     6    14     5    95      180


-----------------------------------------------------------------------
TOTAL      0     6    87   176   659    53    28   240    76   180     1505

PERCENT   .0    .4   5.8  11.7  43.8   3.5   1.9  15.9   5.0  12.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

                1      2      3      4      5      6      7
             -----------------------------------------------
               .0     .6    8.6   17.4   65.3    5.3    2.8

     PERCENT TEACHER TALK  76.15        PERCENT STEADY STATE  51.50

          PERCENT CONTENT  55.48               TOTAL I/I+D  26.66

            REVISED I/I+D  53.45               ROW 8 I/I+D  75.00

        ROW 8 - 9 I/I+D  59.56                ROW 9 I/I+D  95.45

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=53   MATH

--------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10      SUM

--------------------------------------------------------------------
  1         0    0    0    0    1    2    0    0    1    0        4
  2         1    1    4    5   14    2    0    3    1    4       35
  3         0   10   22   26   50    7    0   15    7    9      146
  4         0    1    0   92   45    6    3  377   11  100      635
  5         2    7    2  257  781   58    4   93   18  100     1322
  6         0    0    0   16   51   27    1   20    3   27      145
  7         0    0    0    6    5    1    4    3    0    9       28
  8         0   12   91  149  252   14    4  140    2   49      713
  9         0    2   20    5   13    2    0    0   11    5       58
 10         1    2    7   79  110   26   12   62    4  281      584

--------------------------------------------------------------------
TOTAL       4   35  146  635 1322  145   28  713   58  584     3670
PERCENT    .1  1.0  4.0 17.3 36.0  4.0   .8 19.4  1.6 15.9

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               ------------------------------------------------
                 .2    1.5    6.3   27.4   57.1    6.3    1.2

    PERCENT TEACHER TALK  75.02          PERCENT STEADY STATE  37.03
         PERCENT CONTENT  53.32                 TOTAL I/I+D  35.42

          REVISED I/I+D  51.68                  ROW 8 I/I+D  85.12
       ROW 8 - 9 I/I+D  49.47                   ROW 9 I/I+D  91.67

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
  INTERACTION ANALYSIS

 TEACHER NUMBER=53   COMPOSITE MATRIX


 ------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10      SUM

 ------------------------------------------------------------------
   1         0    0    0    0    2    2    0    0    1    0        5

   2         1    3    4   10   24    5    0    4    3    4       58

   3         0   12   62   61  115   12    0   33   22   26      343

   4         0    3    1  141   61   14    3  650   21  138     1032

   5         3   13    3  409 1861  117   20  131   45  204     2806

   6         0    0    0   32  105  108    3   26   10   85      369

   7         0    0    1   10   16    3   20   15    3   30       98

   8         0   17  190  253  363   30   16  386    7   88     1350

   9         0    4   71    7   29    6    2    2   84   10      215

  10         1    6   11  109  230   72   34  103   19  556     1141


 ------------------------------------------------------------------
 TOTAL       5   58  343 1032 2806  369   98 1350  215 1141     7417

 PERCENT    .1   .8  4.6 13.9 37.8  5.0  1.3 18.2  2.9 15.4

 TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1     2     3     4     5     6     7
             ------------------------------------------
              .1   1.2   7.3  21.9  59.6   7.8   2.1

    PERCENT TEACHER TALK  75.06       PERCENT STEADY STATE  49.72

        PERCENT CONTENT  51.75                TOTAL I/I+D  30.52

        REVISED I/I+D  46.51                  ROW 8 I/I+D  81.82

      ROW 8 - 9 I/I+D  54.86                  ROW 9 I/I+D  90.36

 THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=54   LANGUAGE ARTS

-----------------------------------------------------------------------------
             1     2     3     4     5     6     7     8     9    10       SUM

------ ----------------------------------------------------------------------
   1         0     0     0     0     1     0     0     0     0     0         1
   2         0     5     3     7     5     1     0     0     3     5        29
   3         0     5    14     9    21    10     0     8    25     6        98
   4         0     2     2    16     7     6     4    73    18    10       138
   5         0     4     1    43   199    32     1    13    17    35       345
   6         1     2     2     3    35    30     2    12     4    18       109
   7         0     0     0     3     3     1     4     4     3     5        23
   8         0     4    17    33    29    12     6   106     3    10       220
   9         0     2    54     9    10     5     3     0    86     2       171
  10         0     5     5    15    35    12     3     4    12    76       167


-----------------------------------------------------------------------------
TOTAL        1    29    98   138   345   109    23   220   171   167      1301
PERCENT     .1   2.2   7.5  10.6  26.5   8.4   1.8  16.9  13.1  12.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                   1      2      3      4      5      6      7
                 ---------------------------------------------
                  .1    3.9   13.2   18.6   46.4   14.7    3.1

    PERCENT TEACHER TALK  65.52          PERCENT STEADY STATE  41.20
         PERCENT CONTENT  37.13                  TOTAL I/I+D  35.80

        REVISED I/I+D  49.23                      ROW 8 I/I+D  53.85
         ROW 8 - 9 I/I+D  64.67                   ROW 9 I/I+D  87.50

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=54   SOCIAL STUDIES

-----------------------------------------------------------------------
           1     2     3     4     5     6     7     8     9    10     SUM

-----------------------------------------------------------------------
  1        7     0     0     3     4     0     1     0     2     0      17
  2        0     0     1     2     5     3     0     2     2     1      16
  3        1     3    88    57    70     7     3    15    55     8     307
  4        1     0     2    87    54    10     3   193    75    36     461
  5        5     4    11   150   914    33    15    36    45    29    1242
  6        0     1     0    13    25    20     3    10     9    14      95
  7        1     1     1    13    10     0    20     2     3     4      55
  8        1     4    73    72    94     9     7   256    12     5     533
  9        1     3   125    32    33     5     0     7   243     8     457
 10        0     0     6    32    33     8     3    12    11    57     162

-----------------------------------------------------------------------
TOTAL     17    16   307   461  1242    95    55   533   457   162    3345
PERCENT   .5    .5   9.2  13.8  37.1   2.8   1.6  15.9  13.7   4.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1     2     3     4     5     6     7
              ----------------------------------------
               .8    .7  14.0  21.0  56.6   4.3   2.5

     PERCENT TEACHER TALK  68.90        PERCENT STEADY STATE  50.58
          PERCENT CONTENT  50.91               TOTAL I/I+D  36.53

           REVISED I/I+D  69.39                ROW 8 I/I+D  82.98
       ROW 8 - 9 I/I+D  67.76                  ROW 9 I/I+D  96.27

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=54   MATH

--------------------------------------------------------------------------
          1     2     3     4     5     6     7     8     9    10     SUM

--------------------------------------------------------------------------
 1        0     2     0     2     1     0     0     2     1     1       9
 2        0     0     0     4     6     3     0     0     1     0      14
 3        0     1    31    23    43    14     3    15    14     9     153
 4        1     0     7    96    60    18     2   240    13    46     483
 5        2     4     8   180   590    54     9    43    11    49     950
 6        3     1     2    27    54    72     5    20     6    22     212
 7        0     0     0     6    12     6    15     6     0     2      47
 8        1     4    69    92   124    30     7   180     3    20     530
 9        1     0    33     7    12     0     1     0    12     2      68
10        1     2     3    46    48    15     5    24     7    82     233


--------------------------------------------------------------------------
TOTAL     9    14   153   483   950   212    47   530    68   233    2699
PERCENT  .3    .5   5.7  17.9  35.2   7.9   1.7  19.6   2.5   8.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1     2     3     4     5     6     7
             ------------------------------------------
              .5    .7   8.2  25.9  50.9  11.3   2.5

     PERCENT TEACHER TALK  75.75        PERCENT STEADY STATE  39.94
          PERCENT CONTENT  53.09                TOTAL I/I+D  35.26

          REVISED I/I+D  40.46                  ROW 8 I/I+D  66.67
      ROW 8 - 9 I/I+D  54.33                    ROW 9 I/I+D  97.14

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=54   COMPOSITE MATRIX


 ------------------------------------------------------------------------
              1     2     3     4     5     6     7     8     9    10        SUM

 ------------------------------------------------------------------------
   1          9     2     0     5     8     0     1     2     3     1         31
   2          0     5     4    14    17     8     0     2     7     6         63
   3          1     9   163    93   144    37    10    38   123    25        643
   4          2     2    11   202   125    34    10   527   109    92       1114
   5          8    14    21   385  1869   127    25    92    84   116       2741
   6          4     4     6    47   120   131    10    42    23    59        446
   7          1     1     3    22    25     7    40    13     8    11        131
   8          2    12   164   202   254    56    20   547    18    35       1310
   9          3     7   257    50    56    10     4     7   398    13        805
  10          1     7    14    94   123    36    11    40    32   226        584


 ------------------------------------------------------------------------
TOTAL        31    63   643  1114  2741   446   131  1310   805   584       7868
PERCENT      .4    .8   8.2  14.2  34.8   5.7   1.7  16.6  10.2   7.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               ---------------------------------------------
                 .6    1.2   12.4   21.6   53.0    8.6    2.5

     PERCENT TEACHER TALK  70.96         PERCENT STEADY STATE  59.33
          PERCENT CONTENT  49.00                  TOTAL I/I+D  35.81

          REVISED I/I+D  56.09                    ROW 8 I/I+D  70.08
        ROW 8 - 9 I/I+D  63.54                    ROW 9 I/I+D  95.02

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=64   LANGUAGE ARTS


-----------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10     SUM

-----------------------------------------------------------------
  1        0    0    1    0    1    0    0    0    1    4       7
  2        0    2    0    2    9    1    0    0    5    2      21
  3        0    2   37    7   25    2    0    3   18    9     103
  4        0    0    2   18    7    1    2   43   11   15      99
  5        4   10    2   31  528    9    5   16   22   51     678
  6        0    0    1    1    4    7    0    0    6   11      30
  7        0    0    0    1    7    0    3    1    8   10      30
  8        2    2   19    8   30    2    0   33    3    4     103
  9        0    5   37   13   12    5    6    0  223   28     329
 10        1    0    4   18   55    3   14    7   32  158     292


-----------------------------------------------------------------
TOTAL      7   21  103   99  678   30   30  103  329  292    1692
PERCENT   .4  1.2  6.1  5.9 40.1  1.8  1.8  6.1 19.4 17.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
           -----------------------------------------
             .7   2.2  10.6  10.2  70.0   3.1   3.1

   PERCENT TEACHER TALK  69.14        PERCENT STEADY STATE  59.63
        PERCENT CONTENT  45.92               TOTAL I/I+D  23.76

         REVISED I/I+D  68.59               ROW 8 I/I+D  92.00
     ROW 8 - 9 I/I+D  60.99               ROW 9 I/I+D  79.25

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=64   SOCIAL STUDIES


----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10       SUM


----------------------------------------------------------------------
  1        0    0    0    2    2    0    0    1    0    0         5
  2        0    1    3    4   10    1    0    2    4    1        26
  3        0    2   30   20   34    1    0   12   11   12       122
  4        2    2    2   32   12    2    0   88   16   27       183
  5        0    2    4   52  412    6    0   14   16   27       533
  6        0    0    0    7    5    4    0    4    1    3        24
  7        0    0    0    2    2    1    2    1    6    1        15
  8        2   12   45   22   33    5    4   78    4   13       218
  9        1    3   35   13    5    1    5    2  170    5       240
 10        0    4    3   29   18    3    4   16   11   87       175


----------------------------------------------------------------------
TOTAL      5   26  122  183  533   24   15  218  240  175      1541
PERCENT   .3  1.7  7.9 11.9 34.6  1.6  1.0 14.1 15.6 11.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
             ---------------------------------------------
               .6    2.9   13.4   20.2   58.7    2.6    1.7

    PERCENT TEACHER TALK  66.47         PERCENT STEADY STATE  52.95
         PERCENT CONTENT  46.46                  TOTAL I/I+D  37.00

         REVISED I/I+D  79.69                    ROW 8 I/I+D  86.76
       ROW 8 - 9 I/I+D  71.51                    ROW 9 I/I+D  86.67

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=64   MATH

------------------------------------------------------------------------
          1     2     3     4     5     6     7     8     9    10     SUM

------------------------------------------------------------------------
 1        0     0     1     2     1     3     0     1     0     4      12
 2        0     0     4     1     4     1     0     0     2     2      14
 3        0     1    37    18    36     5     0    17    21    11     146
 4        0     1     3    27    16     5     1    84    16    22     175
 5        4     1     3    56   349    19     2     7    21    25     487
 6        1     1     1     6    13    30     2    11     9    19      93
 7        0     0     2     2     2     1     2     1     7     3      20
 8        2     4    48    31    28     7     0    76     3     9     208
 9        3     5    39     9    10     8    10     0    44    12     140
10        2     1     8    23    27    14     3    11    17   182     288

------------------------------------------------------------------------
TOTAL    12    14   146   175   487    93    20   208   140   288    1583
PERCENT  .8    .9   9.2  11.1  30.8   5.9   1.3  13.1   8.8  18.2

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
               ------------------------------------------------
                1.3    1.5   15.4   18.5   51.4    9.8    2.1

    PERCENT TEACHER TALK  73.13          PERCENT STEADY STATE  47.19
         PERCENT CONTENT  41.82                  TOTAL I/I+D  36.64

          REVISED I/I+D  60.35                  ROW 8 I/I+D  88.52
      ROW 8 - 9 I/I+D  69.12                  ROW 9 I/I+D  72.31

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=64   COMPOSITE MATRIX

--------------------------------------------------------------------
             1     2     3     4     5     6     7     8     9    10       SUM

--------------------------------------------------------------------
   1         0     0     2     4     4     3     0     2     1     8        24
   2         0     4     7     7    25     3     0     3    11     5        65
   3         0     5   139    60   136     9     0    43    71    34       497
   4         2     3     9    83    46     9     4   262    63    74       555
   5         8    14    10   184  1949    40    12    51    88   134      2490
   6         1     1     2    14    30    45     2    19    19    39       172
   7         0     0     2     9    16     2     9     3    23    19        83
   8         6    20   149    73   112    19     4   230    19    29       661
   9         4    13   162    43    47    15    23     8   660    64      1039
  10         3     5    15    78   124    27    29    40    83   524       928

--------------------------------------------------------------------
TOTAL       24    65   497   555  2490   172    83   661  1039   928      6514
PERCENT     .4   1.0   7.6   8.5  38.2   2.6   1.3  10.1  16.0  14.2

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1      2      3      4      5      6      7
             ---------------------------------------------
              .6    1.7   12.8   14.3   64.1    4.4    2.1

    PERCENT TEACHER TALK  69.57        PERCENT STEADY STATE  66.21
         PERCENT CONTENT  46.75                 TOTAL I/I+D  29.36

          REVISED I/I+D  69.68                  ROW 8 I/I+D  88.38
       ROW 8 - 9 I/I+D  68.12                   ROW 9 I/I+D  82.49

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=72   LANGUAGE ARTS

---------------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10       SUM

---------------------------------------------------------------------
  1       0    0    0    0    0    1    0    0    0    0         1
  2       0    0    0    5    4    1    1    0    0    0        11
  3       1    0    4   14   49    6    4    8   18    7       111
  4       0    0    0   11   11    5    3  115    9    5       159
  5       0    0    0   41  582   32   30   46  126   64       921
  6       0    0    0    7   25   86   14   30   21   23       206
  7       0    0    0    5   23   15   88    4   32   21       188
  8       0   11   42   59   70   15    4  126    4    6       337
  9       0    0   62    5  108   21   29    4   50   14       293
 10       0    0    3   12   49   24   15    4   33  128       268


---------------------------------------------------------------------
TOTAL     1   11  111  159  921  206  188  337  293  268      2495
PERCENT  .0   .4  4.4  6.4 36.9  8.3  7.5 13.5 11.7 10.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1     2     3     4     5     6     7
          ---------------------------------------------
              .1    .7   7.0  10.0  57.7  12.9  11.8

     PERCENT TEACHER TALK  71.71      PERCENT STEADY STATE  43.09
          PERCENT CONTENT  43.29              TOTAL I/I+D  17.66

          REVISED I/I+D  23.79                ROW 8 I/I+D  73.61
        ROW 8 - 9 I/I+D  42.02                ROW 9 I/I+D  55.36

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=72   SOCIAL STUDIES

------------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10       SUM

------------------------------------------------------------------------
   1        0    0    0    0    0    0    0    0    0    0         0

   2        0    0    1    0    2    1    0    1    0    1         6

   3        0    0    9    3   62    4    7    2   22    6       115

   4        0    0    0    7    2    1    2   10    3    1        26

   5        0    2    0    9  869   17   18   43  101   16      1075

   6        0    0    0    1   14   47   11   21    5    9       108

   7        0    0    4    3   24   13  121    8   17   12       202

   8        0    2   13    2   47    4   16  543    4    4       635

   9        0    2   87    0   40    9   13    2   82    9       244

  10        0    0    1    1   15   12   14    5   10  116       174


------------------------------------------------------------------------
TOTAL       0    6  115   26 1075  108  202  635  244  174      2585

PERCENT    .0   .2  4.4  1.0 41.6  4.2  7.8 24.6  9.4  6.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1      2      3      4      5      6      7
           ----------------------------------------------------
              .0     .4    7.5    1.7   70.2    7.0   13.2

    PERCENT TEACHER TALK  63.54        PERCENT STEADY STATE  69.40

         PERCENT CONTENT  42.59                 TOTAL I/I+D   9.60

         REVISED I/I+D  28.07                   ROW 8 I/I+D  42.86

       ROW 8 - 9 I/I+D  45.11                   ROW 9 I/I+D  80.18

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=72   MATH

---------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10      SUM

---------------------------------------------------------------------
  1         0    0    0    0    0    0    1    0    0    0        1
  2         0    2    0    0    2    1    0    0    2    2        9
  3         0    0   14   13   33    4    3    5    8    5       85
  4         0    0    1   53   11    2    7   93   10   11      188
  5         0    0    0   46  298   35   21   14   48   23      485
  6         0    2    0   11   21   50   10    9   18   18      139
  7         0    0    0    6   14   10   74    2   36   17      159
  8         1    5   30   33   34    6    5   55   12    4      185
  9         0    0   39   14   43   12   25    1   37   15      186
 10         0    0    1   12   29   19   13    6   15   72      167


---------------------------------------------------------------------
TOTAL       1    9   85  188  485  139  159  185  186  167     1604
PERCENT    .1   .6  5.3 11.7 30.2  8.7  9.9 11.5 11.6 10.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1    2    3    4    5    6    7
                ---------------------------------
                 .1   .8  8.0 17.6 45.5 13.0 14.9

   PERCENT TEACHER TALK  74.18        PERCENT STEADY STATE  40.84
        PERCENT CONTENT  41.96                 TOTAL I/I+D  26.55

       REVISED I/I+D  24.17                    ROW 8 I/I+D  76.60
     ROW 8 - 9 I/I+D  49.39                    ROW 9 I/I+D  51.32

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=72   COMPOSITE MATRIX


-----------------------------------------------------------------------
          1     2     3     4     5     6     7     8     9    10      SUM

-----------------------------------------------------------------------
  1       0     0     0     0     0     1     1     0     0     0        2

  2       0     2     1     5     8     3     1     1     2     3       26

  3       1     0    27    30   147    14    14    15    48    20      316

  4       0     0     1    71    24     8    12   218    22    18      374

  5       0     2     0    97  1762    86    72   103   277   104     2503

  6       0     2     0    19    60   183    38    60    44    53      459

  7       0     0     4    14    64    39   302    14    88    56      581

  8       1    18    85    94   151    25    25   724    20    14     1157

  9       0     2   193    19   192    43    68     7   170    40      734

 10       0     0     5    25    95    57    48    15    63   339      647


-----------------------------------------------------------------------
TOTAL     2    26   316   374  2503   459   581  1157   734   647     6799

PERCENT  .0    .4   4.6   5.5  36.8   6.8   8.5  17.0  10.8   9.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1      2      3      4      5      6      7
          ------------------------------------------------
             .0     .6    7.4    8.8   58.7   10.8   13.6

    PERCENT TEACHER TALK  69.26         PERCENT STEADY STATE  52.89

         PERCENT CONTENT  42.32                TOTAL I/I+D  16.85

         REVISED I/I+D  24.86                  ROW 8 I/I+D  67.53

       ROW 8 - 9 I/I+D  44.98                  ROW 9 I/I+D  63.73

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=73   LANGUAGE ARTS

------------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

------------------------------------------------------------------------
  1        1    0    0    0    0    1    1    0    0    0        3
  2        0    1    0    4    5    8    0   13    3    2       36
  3        0    0   11   11   28    5    1   11   18    8       93
  4        1    3    0   42   24    3    3  168   36   22      302
  5        1    3    5   76  341   18   12   89   88   55      688
  6        0    0    1    3    6   20    8   34   17   24      113
  7        0    0    2    7    7   10   26   19   23   18      112
  8        0   21   42  100  116   24   22  865   65   39     1294
  9        0    6   31   31  105    9   22   52  140   49      445
 10        0    2    1   28   56   15   17   43   55  206      423


------------------------------------------------------------------------
TOTAL      3   36   93  302  688  113  112 1294  445  423     3509
PERCENT   .1  1.0  2.7  8.6 19.6  3.2  3.2 36.9 12.7 12.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1      2      3      4      5      6      7
             ------------------------------------------------
              .2    2.7    6.9   22.4   51.1    8.4    8.3

     PERCENT TEACHER TALK  43.65        PERCENT STEADY STATE  47.11
          PERCENT CONTENT  28.21                TOTAL I/I+D  32.22

         REVISED I/I+D  36.97                   ROW 8 I/I+D  57.80
       ROW 8 - 9 I/I+D  43.67                   ROW 9 I/I+D  54.41

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=73   SOCIAL STUDIES

------------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10        SUM

------------------------------------------------------------------------
   1       0    0    0    0    0    0    0    0    0    0          0
   2       0    0    0    1    0    2    0    2    0    0          5
   3       0    0    4    3    8    0    0    1    2    1         19
   4       0    0    2   19    7    2    1   33   18    6         88
   5       0    2    1   16  194    4    3   33   47   17        317
   6       0    0    0    4    3    6    1   17    3    8         42
   7       0    0    0    1    1    1    9    3   16    3         34
   8       0    3    5   25   42   13    5  445   31    2        571
   9       0    0    5   14   49    8    7   32   71   19        205
  10       0    0    2    5   14    6    8    5   17   80        137


------------------------------------------------------------------------
TOTAL      0    5   19   88  317   42   34  571  205  137       1418
PERCENT   .0   .4  1.3  6.2 22.4  3.0  2.4 40.3 14.5  9.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1      2      3      4      5      6      7
            --------------------------------------------
             .0    1.0    3.8   17.4   62.8    8.3    6.7

     PERCENT TEACHER TALK  39.42         PERCENT STEADY STATE  58.39
          PERCENT CONTENT  28.56                TOTAL I/I+D  22.18

          REVISED I/I+D  24.00                  ROW 8 I/I+D  30.77
        ROW 8 - 9 I/I+D  29.55                  ROW 9 I/I+D  25.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=73   MATH

 -------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10      SUM

 -------------------------------------------------------------------
     1       0    0    0    0    0    0    0    0    0    0        0
     2       0    0    2    1    1    0    0    0    2    0        6
     3       0    0   19   13   21    2    0    7    6    0       68
     4       0    0    1   25    2    1    0   74   22    1      126
     5       0    1    1   21  182    3    4    5   20    5      242
     6       0    0    0    2    0   12    1    4   15    2       36
     7       0    0    1    1    1    0    2    0   14    1       20
     8       0    3   25   36   13    5    3  146   17    1      249
     9       0    2   18   25   17   11    5   13   84   13      188
    10       0    0    1    2    5    2    5    0    8   53       76


 -------------------------------------------------------------------
TOTAL        0    6   68  126  242   36   20  249  188   76     1011
PERCENT     .0   .6  6.7 12.5 23.9  3.6  2.0 24.6 18.6  7.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1      2      3      4      5      6      7
                  ------------------------------------------
                   .0    1.2   13.7   25.3   48.6    7.2    4.0

    PERCENT TEACHER TALK  53.26         PERCENT STEADY STATE  51.73

         PERCENT CONTENT  36.40                 TOTAL I/I+D  40.16

         REVISED I/I+D  56.92                   ROW 8 I/I+D  77.78

        ROW 8 - 9 I/I+D  66.87                  ROW 9 I/I+D  55.56

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=73   COMPOSITE MATRIX

----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

----------------------------------------------------------------------
  1        1    0    0    0    0    1    1    0    0    0        3
  2        0    1    2    6    6   10    0   15    5    2       47
  3        0    0   34   27   57    7    1   19   26    9      180
  4        1    3    3   87   33    6    4  276   78   29      520
  5        1    6    7  114  720   25   19  127  158   77     1254
  6        0    0    1    9    9   39   10   55   35   35      193
  7        0    0    3    9    9   11   37   22   57   24      172
  8        0   27   72  161  171   42   30 1457  113   43     2116
  9        0    8   54   71  175   28   36   97  299   85      853
 10        0    2    4   36   75   24   34   48   82  360      665


----------------------------------------------------------------------
TOTAL      3   47  180  520 1254  193  172 2116  853  665     6003
PERCENT   .0   .8  3.0  8.7 20.9  3.2  2.9 35.2 14.2 11.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
             ---------------------------------------------
               .1    2.0    7.6   22.0   52.9    8.1    7.3

    PERCENT TEACHER TALK  44.38          PERCENT STEADY STATE  59.27
         PERCENT CONTENT  29.55                 TOTAL I/I+D  31.66

           REVISED I/I+D  38.66                 ROW 8 I/I+D  57.89
         ROW 8 - 9 I/I+D  44.91                 ROW 9 I/I+D  49.21

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=75   LANGUAGE ARTS

-------------------------------------------------------------------------
           1     2     3     4     5     6     7     8     9    10     SUM

-------------------------------------------------------------------------
 1         0     0     0     1     0     0     0     0     0     0       1
 2         0     2     1     4     3     1     0     0     1     0      12
 3         0     1     4    13    18     6     1     7    27    12      89
 4         1     2     0    13    12     4     3    81    34    11     161
 5         0     2     1    32   275    18    17    19    50    79     493
 6         0     0     1    12    31    87    13     9    12    23     188
 7         0     0     0    10     8    15    49     8    14    28     132
 8         0     2    18    30    27    13    12   773    35    11     921
 9         0     3    63    25    64    15    16    17   196    18     417
10         0     0     1    21    55    29    21     7    48   413     595

-------------------------------------------------------------------------
TOTAL      1    12    89   161   493   188   132   921   417   595    3009
PERCENT   .0    .4   3.0   5.4  16.4   6.2   4.4  30.6  13.9  19.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1     2     3     4     5     6     7
                 ----------------------------------------
                   .1   1.1   8.3  15.0  45.8  17.5  12.3

        PERCENT TEACHER TALK  44.57        PERCENT STEADY STATE  60.22

             PERCENT CONTENT  21.73                TOTAL I/I+D  24.44

             REVISED I/I+D  24.17                  ROW 8 I/I+D  44.44

          ROW 8 - 9 I/I+D  48.96                   ROW 9 I/I+D  68.04

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=75   SOCIAL STUDIES


---------------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM


---------------------------------------------------------------------------
  1        0    0    0    0    0    0    0    0    0    0        0

  2        0    0    0    0    0    0    0    0    0    0        0

  3        0    0    3    1   12    5    1    6    4    3       35

  4        0    0    0    6    2    0    1   14    3    7       33

  5        0    0    0    9  147    2   16   13   19   12      218

  6        0    0    0    1    0    6    6    6    2    9       30

  7        0    0    0    1   16    4   60   17    4   14      116

  8        0    0    7   10   16    2   18  190    5    9      257

  9        0    0   25    2    8    0    1    3   32    6       77

 10        0    0    0    3   17   11   12    8    8   92      151


---------------------------------------------------------------------------
TOTAL      0    0   35   33  218   30  116  257   77  151      917

PERCENT   .0   .0  3.8  3.6 23.8  3.3 12.6 28.0  8.4 16.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              ---------------------------------------------
                .0     .0    8.1    7.6   50.5    6.9   26.9

    PERCENT TEACHER TALK  56.40        PERCENT STEADY STATE  58.45

         PERCENT CONTENT  27.37               TOTAL I/I+D  15.74

         REVISED I/I+D  19.34                  ROW 8 I/I+D  25.93

     ROW 8 - 9 I/I+D  49.44                   ROW 9 I/I+D  96.15

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=75   MATH

-------------------------------------------------------------------------
              1     2     3     4     5     6     7     8     9    10        SUM

-------------------------------------------------------------------------
   1          0     0     0     0     0     0     0     0     0     0          0
   2          0     0     0     0     0     0     0     0     0     0          0
   3          0     0     2     6    30     5     9     1     8     8         69
   4          0     0     1     4     1     1     1    27     2     5         42
   5          0     0     0     9   157     8     6     2    17    26        225
   6          0     0     1     6     4    67     7     4    17     9        115
   7          0     0     0     1     3     5    22     3    13    21         68
   8          0     0    11     7     5     2     4    21     5     7         62
   9          0     0    52     1     7     9     8     2    31     8        118
  10          0     0     1     8    18    18    11     2    25   207        290


-------------------------------------------------------------------------
TOTAL         0     0    69    42   225   115    68    62   118   290        989
PERCENT      .0    .0   7.0   4.2  22.8  11.6   6.9   6.3  11.9  29.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1       2       3       4       5       6       7
               ---------------------------------------------------------
                 .0      .0    13.3     8.1    43.4    22.2    13.1

      PERCENT TEACHER TALK  74.25          PERCENT STEADY STATE  51.67
           PERCENT CONTENT  27.00                   TOTAL I/I+D  21.39

            REVISED I/I+D  27.38                   ROW 8 I/I+D  64.71
          ROW 8 - 9 I/I+D  66.98                   ROW 9 I/I+D  75.36

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=75   COMPOSITE MATRIX

 ------------------------------------------------------------------------
           1     2     3     4     5     6     7     8     9    10      SUM

 ------------------------------------------------------------------------
   1       0     0     0     1     0     0     0     0     1     0        2
   2       0     2     1     4     3     1     0     0     1     0       12
   3       0     1    10    28    61    16    11    16    40    28      211
   4       1     2     2    32    15     7     6   145    47    31      288
   5       0     2     1    58   598    36    40    34   101   125      995
   6       0     0     2    25    37   182    27    19    40    59      391
   7       0     0     0    15    30    25   153    30    38    79      370
   8       0     2    47    50    53    18    35   998    48    33     1284
   9       0     3   144    33    95    32    33    24   273    42      679
  10       1     0     3    42   103    74    64    18    91   970     1366


 ------------------------------------------------------------------------
TOTAL      2    12   211   288   995   391   370  1284   679  1366     5598
PERCENT   .0    .2   3.8   5.1  17.8   7.0   6.6  22.9  12.1  24.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1      2      3      4      5      6      7
             ---------------------------------------------------
               .1     .5    9.3   12.7   43.9   17.2   16.3

     PERCENT TEACHER TALK  53.62         PERCENT STEADY STATE  61.70

          PERCENT CONTENT  22.92                 TOTAL I/I+D  22.61

           REVISED I/I+D  22.82                  ROW 8 I/I+D  48.04

       ROW 8 - 9 I/I+D  51.19                    ROW 9 I/I+D  69.34

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=77   LANGUAGE ARTS


-----------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10       SUM

-----------------------------------------------------------------------
  1         0     0     0     0     0     0     0     0     0     0         0

  2         0     3     1     3    15     4     1     1     0     2        30

  3         0     1     0    23    53    15     1    12     1     2       108

  4         0     0     2    56    32     9     4   160     0    11       274

  5         0     5     8   116   771    51     4    18     5    33      1011

  6         0     1     1    12    28    22     0    39     0    14       117

  7         0     2     0     3     5     2     1     4     0     6        23

  8         0    16    91    54    67     4     7   188     0     2       429

  9         0     0     3     1     4     0     0     0     1     1        10

 10         0     2     2     6    36    10     5     7     3    45       116


-----------------------------------------------------------------------
TOTAL       0    30   108   274  1011   117    23   429    10   116      2118

PERCENT    .0   1.4   5.1  12.9  47.7   5.5   1.1  20.3    .5   5.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                     1       2       3       4       5       6       7
                 ---------------------------------------------------
                    .0     1.9     6.9    17.5    64.7     7.5     1.5

     PERCENT TEACHER TALK  78.07          PERCENT STEADY STATE  51.32

          PERCENT CONTENT  60.67                 TOTAL I/I+D  26.36

             REVISED I/I+D  49.64                ROW 8 I/I+D  90.68

          ROW 8 - 9 I/I+D  66.80                 ROW 9 I/I+D 100.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=77   SOCIAL STUDIES


----------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10     SUM

----------------------------------------------------------------
  1       0    0    0    1    1    0    0    0    1    0       3
  2       0    3    0    2    4    3    2    0    4    1      19
  3       0    3   15   12   34    9    1   18    3    3      98
  4       0    0    2   29   23    6    2  100   10   21     193
  5       1    4    3   85 1083   62   10   22   11   52    1333
  6       1    2    1    9   55   87    0   26    6   27     214
  7       0    0    0    4    9    3   10    1    2    7      36
  8       1    0   62   28   73    8    3  333    0    5     513
  9       0    3   11    8   15    5    2    0    4    2      50
 10       0    4    4   15   36   31    6   13    9  143     261


----------------------------------------------------------------
TOTAL     3   19   98  193 1333  214   36  513   50  261    2720
PERCENT  .1   .7  3.6  7.1 49.0  7.9  1.3 18.9  1.8  9.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1     2     3     4     5     6     7
            -------------------------------------------
              .2   1.0   5.2  10.2  70.3  11.3   1.9

    PERCENT TEACHER TALK  77.10         PERCENT STEADY STATE  62.76
         PERCENT CONTENT  56.10                  TOTAL I/I+D  16.51

        REVISED I/I+D  32.43                     ROW 8 I/I+D  85.14
     ROW 8 - 9 I/I+D  51.60                      ROW 9 I/I+D  66.67

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=77   MATH

------------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10       SUM

------------------------------------------------------------------------
  1        0    0    0    0    0    0    0    0    0    0         0
  2        0    2    3    6    5    7    0    1    0    3        27
  3        0    1   12    9   28   14    4    4    0    2        74
  4        0    1    2   29   18   12    1  135    9   25       232
  5        0    2    2   88  474   40    2    2    5   21       636
  6        0    0    1   21   40   38    0   21    0   19       140
  7        0    0    1    4    3    1    3    1    0    2        15
  8        0   16   44   51   50    8    2   21    0    1       193
  9        0    3    5    6    1    1    0    0    0    0        16
 10        0    2    4   18   17   19    3    8    2   68       141

------------------------------------------------------------------------
TOTAL      0   27   74  232  636  140   15  193   16  141      1474
PERCENT   .0  1.8  5.0 15.7 43.1  9.5  1.0 13.1  1.1  9.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
            1     2     3     4     5     6     7
          -------------------------------------------
           .0   2.4   6.6  20.6  56.6  12.5   1.3

     PERCENT TEACHER TALK  84.32      PERCENT STEADY STATE  43.89
          PERCENT CONTENT  58.89               TOTAL I/I+D  29.63

          REVISED I/I+D  39.45                 ROW 8 I/I+D  85.71
        ROW 8 - 9 I/I+D  66.84                 ROW 9 I/I+D  88.89

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=77   COMPOSITE MATRIX


--------------------------------------------------------------------------
                1     2     3     4     5     6     7     8     9    10       SUM

--------------------------------------------------------------------------
    1           0     0     0     1     1     0     0     0     1     0         3
    2           0    11     4    11    30    16     3     2     4     6        87
    3           0     5    31    54   142    39     6    42     4     8       331
    4           0     1     9   133    82    27     7   456    20    66       801
    5           1    15    15   344  2699   177    16    56    21   110      3454
    6           1     4     3    44   138   169     0    96     7    65       527
    7           0     2     1    11    17     6    14     6     2    15        74
    8           1    35   237   148   225    23    12   585     0     8      1274
    9           0     6    20    15    20     7     2     0     5     3        78
   10           0     8    11    40   100    63    14    31    14   259       540


--------------------------------------------------------------------------
TOTAL           3    87   331   801  3454   527    74  1274    78   540      7169
PERCENT        .0   1.2   4.6  11.2  48.2   7.4   1.0  17.8   1.1   7.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                    1      2      3      4      5      6      7
               ------------------------------------------------
                   .1    1.6    6.3   15.2   65.5   10.0    1.4

     PERCENT TEACHER TALK  79.60          PERCENT STEADY STATE  60.47
          PERCENT CONTENT  59.35                 TOTAL I/I+D  23.16

          REVISED I/I+D  41.19                   ROW 8 I/I+D  88.64
        ROW 8 - 9 I/I+D  61.52                   ROW 9 I/I+D  74.29

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=80   LANGUAGE ARTS

-----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------------
  1        1    0    1    2    1    1    1    4    1    0       12
  2        2   11    7   20   17    9    2   21    7   10      106
  3        0    8   52   76   76   33   10   75   35   18      383
  4        2    3    9   67   26   16    9  321   62   38      553
  5        1   12    9  121  471   78   16   82   67   92      949
  6        0    0    5   31   53  115   16  121   49   75      465
  7        2    2    2   16   14   23   78   20   18   33      208
  8        3   53  189  117  128   76   28  978   39   63     1674
  9        1    8   83   47   66   44   21   18  355   99      742
 10        0    9   27   56   97   70   27   34  109  479      908

-----------------------------------------------------------------------
TOTAL     12  106  383  553  949  465  208 1674  742  908     6000
PERCENT   .2  1.8  6.4  9.2 15.8  7.7  3.5 27.9 12.4 15.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
          -----------------------------------------
             .4   4.0  14.3  20.7  35.5  17.4   7.8

    PERCENT TEACHER TALK  52.55         PERCENT STEADY STATE  43.45
         PERCENT CONTENT  25.03                 TOTAL I/I+D  39.39

          REVISED I/I+D  42.67                  ROW 8 I/I+D  70.20
       ROW 8 - 9 I/I+D  57.99                   ROW 9 I/I+D  58.60

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=80   SOCIAL STUDIES


-------------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10      SUM


-------------------------------------------------------------------------
   1        0     1     0     2     1     0     0     0     1     3        8

   2        0    15     3     4     7     6     0     4     4    12       55

   3        1     3    12    15    24    15     0    42     3    16      131

   4        0     2     1    18    11    10     3    81     9     9      144

   5        3     5     8    43   166    27     3    30    18    25      328

   6        0     1     3     6    13    26     4    44    17    15      129

   7        0     0     0     4     4     0     9     1     3     7       28

   8        1    15    75    28    56    14     0   494    10    18      711

   9        1     1    22     9    11    13     4     8   199     9      277

  10        2    12     7    15    35    18     5     7    13    93      207


-------------------------------------------------------------------------
TOTAL       8    55   131   144   328   129    28   711   277   207     2018

PERCENT    .4   2.7   6.5   7.1  16.3   6.4   1.4  35.2  13.7  10.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1      2      3      4      5      6      7
           ----------------------------------------------
             1.0    6.7   15.9   17.5   39.9   15.7    3.4

     PERCENT TEACHER TALK  45.44         PERCENT STEADY STATE  51.14

          PERCENT CONTENT  23.39                  TOTAL I/I+D  41.07

         REVISED I/I+D  55.27                     ROW 8 I/I+D  86.67

       ROW 8 - 9 I/I+D  60.80                     ROW 9 I/I+D  58.54

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=80   MATH


----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10       SUM

----------------------------------------------------------------------
  1        1    0    1    0    1    0    0    0    0    1         4
  2        0    0    0    1    2    1    0    0    0    2         6
  3        1    3    5    5   13    2    1    8    2    6        46
  4        0    0    1    4    4    2    1   44    1   10        67
  5        0    2    1   16  113   33    5    9    6   14       199
  6        0    0    2    4   21   13    3   12    3   20        78
  7        0    0    0    0    4    2    8    1    3    2        20
  8        1    1   17   22   22   12    1   36    2    2       116
  9        1    0   16    2    5    0    0    0    5    1        30
 10        0    0    3   13   14   13    1    6    8   93       151


----------------------------------------------------------------------
TOTAL      4    6   46   67  199   78   20  116   30  151       717
PERCENT   .6   .8  6.4  9.3 27.8 10.9  2.8 16.2  4.2 21.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              ------------------------------------------------
                1.0    1.4   11.0   16.0   47.4   18.6    4.8

    PERCENT TEACHER TALK  74.20         PERCENT STEADY STATE  38.77
         PERCENT CONTENT  37.10                 TOTAL I/I+D  29.29

          REVISED I/I+D  36.36                  ROW 8 I/I+D  59.38
       ROW 8 - 9 I/I+D  60.00                   ROW 9 I/I+D 100.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=80   COMPOSITE MATRIX

---------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10      SUM

---------------------------------------------------------------------
   1        2    1    2    4    3    1    1    4    2    4       24

   2        2   28   10   25   26   17    2   25   12   25      172

   3        2   14   69   96  113   52   11  125   40   43      565

   4        2    5   11   91   41   28   13  458   74   57      780

   5        4   19   18  185  758  140   25  121   94  133     1497

   6        0    1   10   44   89  175   29  179   75  117      719

   7        2    3    2   21   24   33  114   22   28   48      297

   8        5   69  282  167  209  103   31 1536   54   87     2543

   9        3    9  125   60   82   62   32   26  573  113     1085

  10        2   23   37   87  152  108   39   47  133  707     1335


---------------------------------------------------------------------
TOTAL      24  172  565  780 1497  719  297 2543 1085 1335     9017

PERCENT    .3  1.9  6.3  8.7 16.6  8.0  3.3 28.2 12.0 14.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              -------------------------------------------------
                .6    4.2   13.9   19.2   36.9   17.7    7.3

     PERCENT TEACHER TALK  52.77          PERCENT STEADY STATE  46.11

          PERCENT CONTENT  25.25                 TOTAL I/I+D  38.01

         REVISED I/I+D  42.82                    ROW 8 I/I+D  72.65

       ROW 8 - 9 I/I+D  58.11                    ROW 9 I/I+D  59.31

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=84   LANGUAGE ARTS


---------------------------------------------------------------
          1    2    3    4    5    6    7    8    9   10     SUM

---------------------------------------------------------------
  1       1    0    0    1    0    0    0    0    0    0       2

  2       0    1    0    2    3    2    1    0    0    0       9

  3       0    3   10   47   36    6    0    1    0    3     106

  4       0    0    4   75   20    5    4   83    7   20     218

  5       1    1    2   44  239   12    3   11    4   31     348

  6       0    0    0   11    6   89    1    6    2   10     125

  7       0    1    0    3    3    2    9    0    0    4      22

  8       0    2   80   15    8    1    0   57    1    3     167

  9       0    0    8    1    4    1    2    0   27    1      44

 10       0    1    2   19   29    7    2    9    3   64     136


---------------------------------------------------------------
TOTAL     2    9  106  218  348  125   22  167   44  136    1177

PERCENT  .2   .8  9.0 18.5 29.6 10.6  1.9 14.2  3.7 11.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
               1     2     3     4     5     6     7
             -----------------------------------------
              .2   1.1  12.8  26.3  41.9  15.1   2.7

   PERCENT TEACHER TALK  79.73        PERCENT STEADY STATE  48.60

        PERCENT CONTENT  40.09                TOTAL I/I+D  40.36

         REVISED I/I+D  44.32                 ROW 8 I/I+D  98.80

     ROW 8 - 9 I/I+D  86.89                   ROW 9 I/I+D  72.73

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=84   SOCIAL STUDIES

-----------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10     SUM


-----------------------------------------------------------------
  1         4    0    0    1    0    0    0    1    1    0       7

  2         0    1    4    3    0    1    1    0    0    2      12

  3         0    5   17   59   71   18    4    9    4   10     197

  4         2    0    1   73   36    2    3   89   17   27     250

  5         0    1    7   54  355   14    6   44   13   12     506

  6         1    0    1   15   14   94    1   10    1    6     143

  7         0    1    1    9    4    4   24    4    0    4      51

  8         0    3  143    8    3    1    2  163    1    8     332

  9         0    1   21   12    5    0    0    0  117    0     156

 10         0    0    3   16   18    9   10   12    2   33     103



-----------------------------------------------------------------
TOTAL       7   12  197  250  506  143   51  332  156  103    1757

PERCENT    .4   .7 11.2 14.2 28.8  8.1  2.9 18.9  8.9  5.9

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
              1     2     3     4     5     6     7
           -----------------------------------------
             .6   1.0  16.9  21.4  43.4  12.3   4.4

    PERCENT TEACHER TALK  70.50        PERCENT STEADY STATE  50.14

        PERCENT CONTENT  43.03                  TOTAL I/I+D  39.97

          REVISED I/I+D  52.68                  ROW 8 I/I+D  97.99

      ROW 8 - 9 I/I+D  94.47                    ROW 9 I/I+D 100.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=84   MATH

----------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10      SUM

----------------------------------------------------------------------
  1         6     0     0     1     0     1     2     1     0     2       13
  2         0     2     2    11    11     8     2     2     0     3       41
  3         1     3    63    65    61    17    10    26     3    30      279
  4         0     2     5   118    19    13     2   179     3    67      408
  5         1    12    14    69   478    36    15    18    11    40      694
  6         2     3     6    11    26   191    16    13     4    44      316
  7         1     1     3    19    16    12   100     2     5    25      184
  8         1    11   149    63    16     2     8    90     2    18      360
  9         0     0    10     4    13     3     4     0     7     1       42
 10         1     7    27    47    54    33    25    29     7   528      758


----------------------------------------------------------------------
TOTAL      13    41   279   408   694   316   184   360    42   758     3095
PERCENT    .4   1.3   9.0  13.2  22.4  10.2   5.9  11.6   1.4  24.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
               ---------------------------------------------
                 .7    2.1   14.4   21.1   35.9   16.3    9.5

      PERCENT TEACHER TALK  82.80          PERCENT STEADY STATE  51.15
          PERCENT CONTENT  35.61                    TOTAL I/I+D  38.29

             REVISED I/I+D  39.98                   ROW 8 I/I+D  94.15
           ROW 8 - 9 I/I+D  83.80                   ROW 9 I/I+D  58.82

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=84   COMPOSITE MATRIX

----------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10       SUM

----------------------------------------------------------------------
   1       11     0     0     3     0     1     2     2     1     2        22
   2        0     4     6    17    14    11     4     2     0     5        63
   3        1    11    93   183   183    41    19    39    14    46       630
   4        2     2    10   281    80    21    13   398    29   122       958
   5        2    14    29   184  1154    63    29    76    34    88      1673
   6        3     3     7    39    48   384    18    29     9    62       602
   7        1     3     4    38    28    19   141    10     6    34       284
   8        1    17   400   100    34     6    14   342     8    31       953
   9        0     1    48    27    26     5     7     0   197     3       314
  10        1     8    34    86   106    51    37    55    16   635      1029


----------------------------------------------------------------------
TOTAL      22    63   630   958  1673   602   284   953   314  1029      6528
PERCENT    .3   1.0   9.7  14.7  25.6   9.2   4.4  14.6   4.8  15.8

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1     2     3     4     5     6     7
               ------------------------------------------
                 .5   1.5  14.9  22.6  39.5  14.2   6.7

     PERCENT TEACHER TALK  76.96          PERCENT STEADY STATE  52.82
          PERCENT CONTENT  40.30                  TOTAL I/I+D  39.53

          REVISED I/I+D  44.66                    ROW 8 I/I+D  95.43
      ROW 8 - 9 I/I+D  86.59                      ROW 9 I/I+D  80.33

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=89   LANGUAGE ARTS


 -------------------------------------------------------------------------
              1    2    3    4    5    6    7    8    9   10       SUM

 -------------------------------------------------------------------------
   1          0    0    0    0    1    0    0    0    0    0         1

   2          0    0    0    1    0    0    0    0    0    0         1

   3          1    0    3   10   26    2    0    7    4    4        57

   4          0    0    0    8    5    0    0   31    1    6        51

   5          0    0    1    9   62    4    0   48    3    4       131

   6          0    0    0    1    4   26    1    1    1    2        36

   7          0    0    0    1    0    0    0    0    0    0         1

   8          0    1   41   17   27    0    0  100    1    5       192

   9          0    0   12    1    1    0    0    0   17    0        31

  10          0    0    0    3    5    4    0    5    4   26        47


 -------------------------------------------------------------------------
TOTAL         1    1   57   51  131   36    1  192   31   47       548

PERCENT      .2   .2 10.4  9.3 23.9  6.6   .2 35.0  5.7  8.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                   1      2      3      4      5      6      7
                 -----------------------------------------------
                  .4     .4   20.5   18.3   47.1   12.9     .4

     PERCENT TEACHER TALK  55.49        PERCENT STEADY STATE  44.16

          PERCENT CONTENT  33.21                TOTAL I/I+D  39.57

            REVISED I/I+D  61.46                ROW 8 I/I+D 100.00

         ROW 8 - 9 I/I+D  72.00                 ROW 9 I/I+D 100.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=89   SOCIAL STUDIES


------------------------------------------------------------------
            1     2     3     4     5     6     7     8     9    10      SUM

------------------------------------------------------------------
   1        2     0     1     2     2     0     1     0     0     1        9
   2        0     4     5     3     7     2     0     6     4     8       39
   3        2     9   121    84   118    14     1    76    76    31      532
   4        0     1     3    91    27     2     0   261    27    50      462
   5        1     1     7   129   868     9     0    43    59    46     1163
   6        0     1     2     2     9    40     2    16     5    13       90
   7        0     0     0     2     5     1     8     5     4     1       26
   8        2    12   240    90    59    10     4   466    14     8      905
   9        0     8   142    15    18     4     7     0   279    12      485
  10        2     3    12    43    50     8     3    32    17   276      446


------------------------------------------------------------------
TOTAL       9    39   532   462  1163    90    26   905   485   446     4157
PERCENT    .2    .9  12.8  11.1  28.0   2.2    .6  21.8  11.7  10.7

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1       2       3       4       5       6       7
             ------------------------------------------------------
               .4     1.7    22.9    19.9    50.1     3.9     1.1

     PERCENT TEACHER TALK  62.54          PERCENT STEADY STATE  51.84
           PERCENT CONTENT  39.09                  TOTAL I/I+D  44.89

          REVISED I/I+D  83.33                     ROW 8 I/I+D  94.78
         ROW 8 - 9 I/I+D  83.31                    ROW 9 I/I+D  93.17

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMRER=89   MATH


-----------------------------------------------------------------------
             1     2     3     4     5     6     7     8     9    10      SUM

-----------  ----------------------------------------------------------
  1          0     1     0     0     1     0     0     0     0     0       2

  2          0     1     0     1     0     1     0     0     1     0       4

  3          1     0     1     6     7     2     0     0     1     6      24

  4          0     0     0     3     4     1     0    15     0    12      35

  5          1     1     0    12   113     2     1     0     2     9     141

  6          0     0     1     1     3    26     0     1     1     9      42

  7          0     0     0     0     0     0     1     0     0     1       2

  8          0     0    16     2     1     0     0     0     0     0      19

  9          0     0     6     0     2     0     0     0     1     0       9

 10          0     1     0    10    10    10     0     3     3    79     116


-----------------------------------------------------------------------
TOTAL        2     4    24    35   141    42     2    19     9   116     394

PERCENT     .5   1.0   6.1   8.9  35.8  10.7    .5   4.8   2.3  29.4

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                   1      2      3      4      5      6      7
                 -----------------------------------------------
                  .8    1.6    9.6   14.0   56.4   16.8     .8

    PERCENT TEACHER TALK  89.93         PERCENT STEADY STATE  57.11

          PERCENT CONTENT  44.67                  TOTAL I/I+D  26.00

          REVISED I/I+D  40.54                   ROW 8 I/I+D 100.00

        ROW 8 - 9 I/I+D  88.89                   ROW 9 I/I+D 100.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=89   COMPOSITE MATRIX

--------------------------------------------------------------------------
           1     2     3     4     5     6     7     8     9    10     SUM

--------------------------------------------------------------------------
  1        2     1     1     2     4     0     1     0     0     1      12
  2        0     7     6     5     9     4     0     7     8     9      55
  3        4    11   151   121   195    23     1   120    97    54     777
  4        0     1     5   142    48     3     1   364    31    96     691
  5        2     4    11   194  1358    21     1   118    80    81    1870
  6        0     2     5     6    22   131     3    25     8    31     233
  7        0     0     0     3     6     1    10     5     4     2      31
  8        2    15   387   124   110    13     4   947    18    20    1640
  9        0     9   193    16    28     5     7     0   381    15     654
 10        2     5    19    77    90    32     3    54    27   531     840

--------------------------------------------------------------------------
TOTAL     12    55   777   691  1870   233    31  1640   654   840    6802
PERCENT   .2    .8  11.4  10.2  27.5   3.4    .5  24.1   9.6  12.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
             1     2     3     4     5     6     7
          -------------------------------------------
            .3   1.5  21.2  18.8  51.0   6.4    .8

     PERCENT TEACHER TALK  61.53         PERCENT STEADY STATE  68.99
          PERCENT CONTENT  37.65                TOTAL I/I+D  41.84

         REVISED I/I+D  76.17                  ROW 8 I/I+D  95.96
      ROW 8 - 9 I/I+D  81.71                  ROW 9 I/I+D  94.39

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=91   LANGUAGE ARTS


 ---------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10       SUM

 ---------------------------------------------------------------------
    1        1    2    0    0    1    0    0    0    2    1         7
    2        2   10    6    2    4    2    1    2    5    3        37
    3        1    6   30   17   28    6    5   13   22   16       144
    4        0    0    4    6    8    3    3   52   12   25       113
    5        0    2    0   28  283   35   13   11   39   56       467
    6        0    0    0    6   20   47    9    5   15   38       140
    7        0    0    1    8   13   11  101    9   32   41       216
    8        1    7   37   12   21    6   16   14    6   12       132
    9        2   10   60    5   32    7   26    5  310   33       490
   10        0    0    6   29   57   24   42   21   46  559       784


 ---------------------------------------------------------------------
TOTAL        7   37  144  113  467  140  216  132  490  784      2530
PERCENT     .3  1.5  5.7  4.5 18.5  5.5  8.5  5.2 19.4 31.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                       1     2     3     4     5     6     7
                    ---------------------------------------------
                      .6   3.3  12.8  10.1  41.5  12.5  19.2

     PERCENT TEACHER TALK  64.38        PERCENT STEADY STATE  53.79
          PERCENT CONTENT  22.92                TOTAL I/I+D  26.78

           REVISED I/I+D  34.56                ROW 8 I/I+D  67.16
         ROW 8 - 9 I/I+D  55.37                ROW 9 I/I+D  68.57

THFSE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=91   SOCIAL STUDIES


------------------------------------------------------------------
             1    2    3    4    5    6    7    8    9   10     SUM


------------------------------------------------------------------
     1       0    0    0    0    0    0    0    0    0    0       0

     2       0    0    0    0    0    0    0    0    0    0       0

     3       0    0    0    1    5    0    0    2    0    3      11

     4       0    0    1    2    0    0    0    7    0    3      13

     5       0    0    0    4  101    3    2    1    7    6     124

     6       0    0    0    0    1    2    0    0    0    4       7

     7       0    0    0    0    2    0    1    0    2    3       8

     8       0    0   10    0    0    0    1    2    0    0      13

     9       0    0    0    1    6    0    3    0    9    5      24

    10       0    0    0    5    9    2    1    1    6   30      54


------------------------------------------------------------------
TOTAL        0    0   11   13  124    7    8   13   24   54     254

PERCENT     .0   .0  4.3  5.1 48.8  2.8  3.1  5.1  9.4 21.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                 1      2      3      4      5      6      7
              ------------------------------------------------
                .0     .0    6.7    8.0   76.1    4.3    4.9

    PERCENT TEACHER TALK  81.50         PERCENT STEADY STATE  57.87

         PERCENT CONTENT  53.94                TOTAL I/I+D  14.72

        REVISED I/I+D  42.31                   ROW 8 I/I+D  90.91

      ROW 8 - 9 I/I+D  52.38                   ROW 9 I/I+D    .00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=91   MATH

 ------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10       SUM

 ------------------------------------------------------------------
   1       0    0    0    0    1    0    0    0    1    0         2
   2       0    0    0    0    3    1    1    0    1    0         6
   3       0    1   16    9   38    4    1    6   10   10        95
   4       0    0    1   11   15    1    5   54   12    8       107
   5       1    1    2   48  568   12   19    8   49   70       778
   6       0    0    0    2    9   21    5    2   14   23        76
   7       0    1    0    3   12    9   55    2   26   33       141
   8       0    1   31   14   15    3    4    3    5    6        82
   9       0    1   40    5   31   12   16    1   53   37       196
  10       1    1    5   15   86   13   36    6   25  256       444


 ------------------------------------------------------------------
TOTAL      2    6   95  107  778   76  141   82  196  444      1927
PERCENT   .1   .3  4.9  5.6 40.4  3.9  7.3  4.3 10.2 23.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1      2      3      4      5      6      7
              ------------------------------------------
                 .2     .5    7.9    8.9   64.6    6.3   11.7

    PERCENT TEACHER TALK  81.25        PERCENT STEADY STATE  51.01
         PERCENT CONTENT  45.93                 TOTAL I/I+D  17.43

          REVISED I/I+D  32.19                  ROW 8 I/I+D  82.05
      ROW 8 - 9 I/I+D  53.18                    ROW 9 I/I+D  59.42

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=91   COMPOSITE MATRIX

----------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10        SUM

----------------------------------------------------------------------
   1       1    2    0    0    2    0    0    0    3    2         10

   2       2   10    6    3    7    3    2    2    6    4         45

   3       1    7   48   28   76   11    7   23   36   37        274

   4       0    0    7   29   23    4   10  132   32   48        285

   5       1    3    2   97 1027   56   42   20  107  159       1514

   6       0    0    0    9   37   83   21    7   35   84        276

   7       1    1    1   13   33   26  206   11   70  107        469

   8       1    8   85   31   37    9   22   19   12   25        249

   9       2   11  113   14   78   25   52    6  386   96        783

  10       1    3   12   61  194   60  109   29   95 1236       1800


----------------------------------------------------------------------
TOTAL     10   45  274  285 1514  276  469  249  783 1800       5705

PERCENT   .2   .8  4.8  5.0 26.5  4.8  8.2  4.4 13.7 31.6

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                1    2    3    4    5    6    7
              -----------------------------------
               .3  1.6  9.5  9.9 52.7  9.6 16.3

     PERCENT TEACHER TALK  73.57         PERCENT STEADY STATE  59.60

         PERCENT CONTENT  31.53                 TOTAL I/I+D  21.37

          REVISED I/I+D  30.63                  ROW 8 I/I+D  75.20

      ROW 8 - 9 I/I+D  54.30                    ROW 9 I/I+D  62.07

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=95   LANGUAGE ARTS

-----------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10      SUM

-----------------------------------------------------------------------
   1        0    0    0    1    0    0    0    0    0    1        2

   2        0    0    2    3    5    3    1    0    0    1       15

   3        0    2   13   47   27    8    4    9   22   21      153

   4        0    0    4   52   14    8    8  132   35   41      294

   5        1    1    3   43  239   34   15  111   34   51      532

   6        0    0    0    9   35   71    7   20    6   38      186

   7        0    0    2    8   21    9   44   22   18   28      152

   8        0    7   75   54   92   17   20  120   35   39      459

   9        0    4   40   21   34   12   24   14   56   30      235

  10        1    1   14   56   65   24   29   31   29  395      645


-----------------------------------------------------------------------
TOTAL       2   15  153  294  532  186  152  459  235  645     2673

PERCENT    .1   .6  5.7 11.0 19.9  7.0  5.7 17.2  8.8 24.1

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

                 1     2     3     4     5     6     7
              -----------------------------------------
                .1   1.1  11.5  22.0  39.9  13.9  11.4

    PERCENT TEACHER TALK  65.78        PERCENT STEADY STATE  37.04

         PERCENT CONTENT  30.90                TOTAL I/I+D  34.78

         REVISED I/I+D  33.46                  ROW 8 I/I+D  68.91

       ROW 8 - 9 I/I+D  50.25                  ROW 9 I/I+D  55.00

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=95   SOCIAL STUDIES

----------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10     SUM

----------------------------------------------------------------
   1        0    0    0    0    0    0    0    0    1    0       1
   2        0    0    0    0    0    0    0    0    1    0       1
   3        0    1   21   21   18    2    3   11   28    9     114
   4        0    0    2   32    6    1    1   61   15   35     153
   5        0    0    0   22   63    8    1    2   13   11     120
   6        0    0    0    0    1   10    0    5    3   12      31
   7        0    0    1    9    1    1    7    1    4    4      28
   8        1    0   37   30   10    1    3  111    1   13     207
   9        0    0   46    5    3    2    6    0   77   14     153
  10        0    0    7   34   18    6    7   16   10   67     165


----------------------------------------------------------------
TOTAL       1    1  114  153  120   31   28  207  153  165     973
PERCENT    .1   .1 11.7 15.7 12.3  3.2  2.9 21.3 15.7 17.0

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
            1       2       3       4       5       6       7
          -------------------------------------------------
           .2      .2    25.4    34.2    26.8     6.9     6.3

   PERCENT TEACHER TALK  55.45        PERCENT STEADY STATE  39.88
        PERCENT CONTENT  28.06                TOTAL I/I+D  60.04

        REVISED I/I+D  66.29                ROW 8 I/I+D  90.48
      ROW 8 - 9 I/I+D  82.64                ROW 9 I/I+D  85.19

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
 INTERACTION ANALYSIS

TEACHER NUMBER=95   MATH

---------------------------------------------------------------------
            1    2    3    4    5    6    7    8    9   10       SUM

---------------------------------------------------------------------
   1        0    0    0    0    0    0    0    0    0    0         0

   2        0    1    1    4    7    5    0    0    0    0        18

   3        0    7    6   24   15    5    6    2    4    1        70

   4        0    0    2   27   18    2    2   49    3   13       116

   5        0    2    0   20   77    2    5   16    6    9       137

   6        0    0    0    4    9   38    3    3    4    5        66

   7        0    0    2    7    6    7   24    2    0    4        52

   8        0    6   40   16    0    1    8  134    2    4       211

   9        0    0   15    0    1    1    1    0   36    4        58

  10        0    2    4   14    4    5    3    5    3  102       142


---------------------------------------------------------------------
TOTAL       0   18   70  116  137   66   52  211   58  142       870

PERCENT    .0  2.1  8.0 13.3 15.7  7.6  6.0 24.3  6.7 16.3

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS
                  1     2     3     4     5     6     7
              -----------------------------------------
                 .0   3.9  15.3  25.3  29.8  14.4  11.3

     PERCENT TEACHER TALK  63.05         PERCENT STEADY STATE  51.15

          PERCENT CONTENT  29.08                  TOTAL I/I+D  44.44

         REVISED I/I+D  42.72                     ROW 8 I/I+D  83.64

       ROW 8 - 9 I/I+D  86.52                     ROW 9 I/I+D  88.24

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

```
INTERACTION ANALYSIS

TEACHER NUMBER=95   COMPOSITE MATRIX

------------------------------------------------------------------
           1    2    3    4    5    6    7    8    9   10      SUM

------------------------------------------------------------------
  1        0    0    0    2    0    0    1    0    1    1        5

  2        0    1    3    8   14    8    1    0    2    1       38

  3        0   10   79  139   90   17   15   51   99   40      540

  4        0    0   11  206   48   12   15  362   95  136      885

  5        1    3    5  147  585   56   25  131   61   92     1106

  6        0    0    0   17   54  158   11   33   16   67      356

  7        0    0    6   31   34   18   87   29   28   47      280

  8        1   15  223  150  122   23   38  540   44   71     1227

  9        1    6  181   39   47   21   35   15  312   57      714

 10        2    3   32  146  112   43   52   66   56  654     1166


------------------------------------------------------------------
TOTAL      5   38  540  885 1106  356  280 1227  714 1166     6317

PERCENT   .1   .6  8.5 14.0 17.5  5.6  4.4 19.4 11.3 18.5

TYPE OF TEACHER STATEMENTS AS PERCENT OF TOTAL TEACHER STATEMENTS

                 1     2     3     4     5     6     7
               ------------------------------------------
                .2   1.2  16.8  27.6  34.5  11.1   8.7

    PERCENT TEACHER TALK  62.32        PERCENT STEADY STATE  53.65

         PERCENT CONTENT  31.52                 TOTAL I/I+D  45.73

         REVISED I/I+D  47.83                   ROW 8 I/I+D  79.67

     ROW 8 - 9 I/I+D  68.29                     ROW 9 I/I+D  77.05

THESE ARE I/D RATIOS EXPRESSED AS (I/(I+D))*100.  I.E. PERCENTS.
```

Part IV

SEVENTH AND EIGHTH GRADES

The interaction analysis data from the Minnesota classes of seventh grade social studies combined with English (two hour, core) and the single hour mathematics classes of eighth grade students are included from an earlier project. These data are described in Chapter 4, Volume I, of this report. The code numbers of the teachers include both letters and arabic numbers. When the first letter is the same as another at that same grade level, the two teachers came from the same school. The first arabic number is seven for all seventh grade teachers and eight for all eighth grade teachers.

Attitude and Achievement Data.

Tables IV-1 and IV-2 show the means and variances for the seventh and eighth grade pupil attitude tests. These scores are construed as representing liking a teacher and liking the class learning activities.

Tables IV-3 and IV-4 show the means and variances for the seventh and eighth grade achievement tests.

TABLE IV-1

M.S.A.I. (LONG FORM) CLASS AVERAGES IN SOCIAL STUDIES

Teacher Style	Class Code	N	Mean	Variance
Indirect	C 704	23	259	692.6
	H 704	24	229	1139.4
	L 706	34	220	1336.7
	M 701	29	253	1314.2
	P 703	22	263	726.5
	R 701	24	261	1305.0
	P 701	24	264	621.7
	All S's	180	248**	1317.3
Direct	B 704	24	206	785.3
	D 706	23	201	895.1
	G 703	19	267	275.4
	Q 701	28	199	2182.9
	A 701	20	216	1075.5
	D 708	28	269	856.1
	F 701	27	233	863.5
	R 702	27	224	607.9
	All S's	196	227**	1614.8

**C.R. = 5.33

TABLE IV-2

M.S.A.I. (LONG FORM) CLASS AVERAGES IN MATHEMATICS

Teacher Style	Class Code	N	Mean	Variance
Indirect	A 803	29	248	963.0
	C 801	21	258	896.8
	D 804	32	262	990.4
	I 801	22	255	700.7
	P 805	33	273	438.1
	V 803	21	222	730.0
	M 805	29	247	610.7
	All S's	187	254**	933.9
Direct	E 802	22	209	1037.0
	H 802	27	229	1468.9
	M 802	26	258	471.4
	V 804	25	254	849.8
	A 802	19	237	625.5
	G 801	16	261	380.3
	G 802	17	196	551.2
	L 803	15	267	826.2
	T 802	20	225	560.1
	All S's	187	237**	1242.0

**C.R. = 4.98

TABLE IV-3

MEANS AND VARIANCES OF PRE AND FINAL ACHIEVEMENT MEASURE SOCIAL STUDIES

Teacher Style	Class Code	N	Pre-test		Final Test	
			Mean	Variance	Mean	Variance
Indirect	R 701	30	24.30	37.46	35.53	36.22
	P 703	28	23.07	29.70	32.78	34.40
	C 704	23	27.57	28.98	37.43	35.43
	L 706	32	28.59	26.38	40.47	22.57
	H 704	26	26.35	37.12	35.88	35.79
	P 701	30	23.23	19.91	33.43	40.87
	M 701	30	28.10	32.23	39.67	50.71
	All S's	199	25.87	34.06	36.51	36.57
Direct	R 702	27	25.04	58.96	35.41	39.25
	F 701	29	29.48	29.54	37.97	51.89
	D 706	27	25.70	26.83	30.59	21.94
	Q 701	24	26.29	29.09	34.92	43.30
	A 701	25	25.04	39.87	34.20	33.75
	D 708	29	25.55	17.40	35.66	27.59
	G 703	22	22.64	23.86	32.00	46.19
	B 704	28	22.00	14.07	24.43	28.92
	All S's	211	25.39	33.59	33.15	36.60

C.R. = 5.62

TABLE IV-4

MEANS AND VARIANCES OF PRE AND FINAL ACHIEVEMENT MEASURE MATHEMATICS

Teacher Style	Class Code	N	Pre-test		Final Test	
			Mean	Variance	Mean	Variance
Indirect	D 804	29	23.83	80.22	33.0	143.3
	C 801	24	23.58	59.64	30.8	48.6
	I 801	24	22.67	61.71	29.2	83.3
	P 805	32	15.72	46.53	25.6	122.6
	A 803	27	12.41	32.48	18.4	55.2
	M 805	29	21.00	73.07	27.8	114.7
	V 803	28	26.50	129.96	34.8	98.5
	All S's	193	20.67	87.61	28.5	120.0
Direct	M 802	25	23.88	63.03	32.1	97.7
	G 801	19	19.00	121.33	19.8	208.4
	V 804	24	23.80	100.50	34.4	121.9
	H 802	27	22.48	136.72	28.2	172.8
	L 803	15	12.00	32.28	15.4	73.3
	T 802	21	20.57	49.36	26.5	70.6
	E 802	20	27.25	58.09	31.2	69.5
	A 802	22	21.27	64.11	28.6	72.1
	G 802	19	12.53	23.82	16.4	40.8
	All S's	193	20.84	93.13	26.7	141.1

C.R. = 1.55

Seventh and Eighth Grade Interaction Data.

On the pages that follow there are first composite matrices which combine the interaction chains from those classes that fall above and below the median of a distribution of the i/d ratios. First, for seventh grade social studies and second, for eighth mathematics. These composite matrices are then followed by the individual matrices for each teacher. Data concerning the further subdivision of each teacher's use of time is not available for publication in this volume.

COMBINED MATRIX FOR INDIRECT SOCIAL STUDIES TEACHERS; N = 7

(R 701, P 703, C 704, L 706, H 704, P 701, M 701)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	8	9	3	3	2	4	2	31
2	3	32	74	83	69	13	4	12	35	27	352
3	1	39	714	501	525	49	12	101	212	180	2334
4	5	9	22	618	166	48	19	1631	338	176	3032
5	11	29	38	792	8758	203	73	45	319	289	10557
6	2	3	3	92	158	451	43	113	62	284	1211
7	2	2	3	47	85	33	191	12	17	84	476
8	--	137	723	502	303	90	28	2932	122	108	4945
9	2	92	733	180	213	55	30	8	1250	109	2672
10	5	9	24	209	271	266	73	89	313	1325	2584
TOTAL	31	352	2334	3032	10557	1211	476	4945	2672	2584	28,194

COMBINED MATRIX FOR DIRECT SOCIAL STUDIES TEACHERS, N' = 8
(R 702, F 701, D 706, Q 701, A 701, D 708, G 703, B 704)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	4	1	1	--	--	3	--	9
2	--	13	22	67	75	33	7	13	17	27	274
3	1	16	98	160	210	26	17	44	79	67	718
4	2	6	13	491	78	79	42	1472	186	184	2553
5	1	26	19	699	4028	371	115	119	313	378	6069
6	3	7	4	138	208	890	97	272	175	539	2333
7	--	9	2	141	120	104	569	46	77	189	1257
8	--	134	305	460	605	190	112	3009	119	141	5075
9	--	42	242	121	394	196	81	10	834	137	2057
10	2	21	13	272	350	443	217	90	254	1634	3296
TOTAL	9	274	718	2553	6069	2333	1257	5075	2057	3296	23641

COMBINED MATRIX FOR INDIRECT MATHEMATICS TEACHERS, N = 7'
(D 804, C 801, I 801, P 805, A 803, M 805, V 803)

CATE GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	3	1	3	9	30	1	1	1	3	8	59
2	1	42	71	72	140	13	4	3	33	61	440
3	5	68	765	412	537	22	9	66	130	101	2115
4	7	13	19	722	176	44	8	1934	121	221	3265
5	22	33	56	1226	10014	231	44	23	312	225	12186
6	1	--	5	47	139	253	7	158	49	223	882
7	--	2	3	31	41	15	65	12	16	61	246
8	8	191	757	466	600	92	28	530	78	49	2799
9	7	76	421	93	220	46	23	4	651	56	1597
10	5	14	15	187	289	165	57	68	205	1489	2494
TOTAL	59	440	2115	3265	12186	882	246	2799	1597	2494	26083

COMBINED MATRIX FOR DIRECT MATHEMATICS TEACHERS, N = 9
(M 802, G 801, V 804, H 802, L 803, T 802, E 802, G 802, A 802)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	4	1	1	3	12	3	2	1	5	5	37
2	2	29	26	54	87	37	4	8	30	71	348
3	2	15	174	154	268	40	12	32	91	72	860
4	2	10	4	222	111	85	27	2214	188	254	3117
5	14	43	23	1127	10240	591	234	92	519	478	13361
6	1	5	1	149	313	906	111	582	202	558	2828
7	1	6	3	111	246	130	616	40	105	266	1524
8	1	138	350	818	991	379	139	1177	114	152	4259
9	6	60	266	186	670	232	129	12	487	158	2206
10	4	41	12	293	423	425	250	101	465	2172	4186
TOTAL	37	348	860	3117	13361	2828	1524	4259	2206	4186	32726

TOTAL MATRIX FOR A 701

(Classified as Direct and Average)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	--	--	--	--	--	1	--	1
2	--	--	1	12	5	4	--	2	--	4	28
3	--	2	14	17	26	2	5	9	7	4	86
4	--	2	3	160	20	14	12	171	4	52	438
5	1	--	3	79	572	42	10	8	18	25	758
6	--	--	1	25	18	186	6	11	12	75	334
7	--	1	--	13	12	18	94	4	2	17	161
8	--	19	38	62	44	16	11	176	14	6	386
9	--	3	25	11	18	8	3	1	100	--	169
10	--	1	1	59	43	44	20	4	11	680	863
TOTAL	1	28	86	438	758	334	161	386	169	863	3224

TOTAL MATRIX FOR B 704

(Classified as Direct and Most Direct)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	--	--	--	--	--	--	--	0
2	--	5	1	1	6	6	4	2	2	1	28
3	--	--	2	2	3	1	1	--	3	2	12
4	--	--	--	5	5	3	3	24	12	13	65
5	--	4	--	25	436	29	9	19	24	25	571
6	--	2	--	5	16	107	18	24	15	33	220
7	--	1	--	2	12	15	199	5	24	44	302
8	--	3	1	8	36	7	11	282	3	17	368
9	--	11	8	1	35	17	19	1	20	13	125
10	--	2	--	18	22	35	38	11	22	147	295
TOTAL	0	28	12	65	571	220	302	370	125	295	1986

TOTAL MATRIX FOR C 704

(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	---	---	---	2	---	---	---	2
2	---	---	12	2	4	---	1	---	6	5	30
3	---	4	159	62	114	15	1	33	50	76	514
4	---	---	3	72	33	6	---	168	96	10	388
5	2	4	10	148	1580	31	13	1	47	58	1894
6	---	---	---	13	38	55	4	13	8	30	161
7	---	---	---	5	11	3	55	---	1	16	91
8	---	5	74	45	53	15	2	55	12	14	275
9	---	16	252	24	27	7	5	1	272	21	625
10	---	1	4	17	34	29	8	4	133	198	428
TOTAL	2	30	514	388	1894	161	91	275	625	428	4408

TOTAL MATRIX FOR D 706

(Direct and Most Direct Classification)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	---	---	---	---	---	---	---	0
2	---	3	3	11	8	3	1	1	3	2	35
3	---	2	11	43	29	2	4	2	6	4	103
4	---	2	3	55	10	7	17	164	45	23	326
5	---	4	4	61	204	10	24	4	19	20	350
6	---	1	---	16	8	24	12	17	8	21	107
7	---	4	---	50	14	13	80	15	12	35	223
8	---	10	63	46	27	23	21	182	5	16	393
9	---	3	19	11	31	10	18	2	63	14	171
10	---	6	---	33	19	15	46	6	10	74	209
TOTAL	0	35	103	326	350	107	223	393	171	209	1917

TOTAL MATRIX FOR D 708

(Classified as Direct and Average)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	---	---	---	---	---	---	---	0
2	---	---	1	1	2	3	---	---	---	---	7
3	---	1	3	16	15	---	---	1	2	1	39
4	---	---	---	7	3	12	---	225	50	6	303
5	---	1	1	115	241	61	6	22	18	37	502
6	---	1	1	20	46	107	9	48	21	94	347
7	---	---	---	9	4	6	6	1	1	4	31
8	---	3	25	97	115	32	4	923	15	8	1222
9	---	---	8	20	63	35	2	---	121	16	265
10	---	1	---	18	13	91	4	2	37	103	269
TOTAL	0	7	39	303	502	347	31	1222	265	269	2985

TOTAL MATRIX FOR F 701

(Classified as Direct and Average)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	3	---	---	---	---	2	---	5
2	---	2	4	21	21	2	2	4	1	6	64
3	1	6	34	19	38	6	1	12	11	10	128
4	2	2	2	178	22	12	4	372	19	54	667
5	---	4	2	195	912	48	10	25	26	41	1263
6	1	1	---	13	17	63	7	28	11	81	222
7	---	1	---	33	12	5	35	2	4	15	107
8	---	42	50	121	166	24	31	681	13	29	1157
9	---	4	34	14	27	9	1	1	111	9	210
10	1	2	1	70	58	53	16	32	12	305	550
TOTAL	5	64	128	667	1263	222	107	1157	210	550	4373

TOTAL MATRIX FOR G 703

(Classified as Direct and Most Direct)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	1	---	1	---	---	---	---	2
2	---	1	3	2	10	1	---	---	4	5	26
3	---	1	---	3	42	3	1	2	4	3	59
4	---	---	3	3	1	5	---	129	14	9	164
5	---	8	1	84	855	69	29	1	117	145	1309
6	1	2	---	12	51	228	24	15	54	117	504
7	---	---	---	10	41	23	88	1	12	44	219
8	---	4	19	11	60	14	4	11	10	30	163
9	---	5	30	16	129	64	15	1	47	37	344
10	1	5	3	22	120	96	58	3	82	542	932
TOTAL	2	26	59	164	1309	504	219	163	344	932	3722

TOTAL MATRIX FOR H 704

(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	---	1	---	---	1	---	1	3
2	---	8	5	8	12	---	---	3	3	5	44
3	---	6	88	37	60	1	2	10	28	25	257
4	1	1	---	81	17	3	3	175	10	22	313
5	2	2	6	106	2429	17	16	2	80	35	2695
6	---	---	---	6	20	58	9	8	9	35	145
7	---	---	---	8	20	10	61	5	4	17	125
8	---	18	72	35	44	6	7	774	24	13	993
9	---	8	83	15	54	2	7	4	271	25	469
10	---	1	3	17	38	48	20	11	40	207	385
TOTAL	3	44	257	313	2695	145	125	993	469	385	5429

TOTAL MATRIX FOR L 706

(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	3	1	2	1	---	3	---	10
2	---	6	15	9	4	7	---	5	10	1	57
3	1	5	148	78	53	9	1	17	44	8	364
4	2	1	3	162	43	4	---	277	26	36	554
5	1	1	10	120	1016	43	4	7	39	39	1280
6	2	---	1	9	22	65	5	44	7	70	225
7	1	---	1	3	8	1	6	2	1	1	24
8	---	30	90	118	58	23	5	1149	30	17	1520
9	1	14	93	26	20	10	1	3	286	5	459
10	2	---	3	26	55	61	1	16	13	307	484
TOTAL	10	57	364	554	1280	225	24	1520	459	484	4977

TOTAL MATRIX FOR M 701

(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	2	---	---	---	---	---	---	2
2	1	1	10	31	13	1	---	1	3	1	62
3	---	3	13	67	39	8	---	---	7	5	142
4	---	1	3	66	14	9	4	248	99	13	457
5	---	3	2	109	253	39	12	2	13	14	447
6	---	1	---	33	23	124	3	13	15	43	255
7	---	1	---	12	10	5	10	1	1	7	47
8	---	30	71	79	38	13	4	34	37	7	303
9	---	21	42	38	43	19	4	---	156	15	338
10	1	1	1	20	14	37	10	4	17	119	224
TOTAL	2	62	142	457	447	255	47	303	338	224	2277

TOTAL MATRIX FOR P 701

(Classified as Indirect and Average)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	1	1	1	--	--	1	--	4
2	1	6	6	9	6	1	2	1	5	6	43
3	--	5	28	85	48	6	3	4	21	23	223
4	1	1	6	57	21	14	6	272	44	30	452
5	1	4	2	82	382	17	13	5	32	47	585
6	--	--	1	19	10	36	16	27	15	36	160
7	1	--	1	10	17	10	27	2	9	26	103
8	--	12	104	93	43	28	10	435	15	19	759
9	--	12	73	53	27	11	11	--	87	24	298
10	--	3	2	43	30	36	15	13	69	113	324
TOTAL	4	43	223	452	585	160	103	759	298	324	2951

TOTAL MATRIX FOR P 703

(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	2	2	--	--	--	--	1	5
2	1	6	19	21	12	4	--	2	5	6	76
3	--	14	147	122	109	3	1	22	5	28	451
4	1	5	7	223	28	8	3	338	12	56	681
5	--	6	2	134	1122	34	1	27	35	57	1419
6	--	1	--	8	28	84	4	6	3	48	182
7	--	--	--	3	1	3	17	2	--	11	37
8	--	34	228	88	45	3	--	458	9	27	893
9	1	--	43	11	29	2	1	--	97	9	202
10	1	1	5	69	42	41	10	38	36	278	521
TOTAL	5	76	451	681	1419	182	37	893	202	521	4467

TOTAL MATRIX FOR Q 701

(Classified as Direct and Most Direct)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	---	---	---	---	---	---	---	0
2	---	2	5	18	22	14	---	2	4	9	76
3	---	3	2	16	12	1	2	1	1	4	42
4	---	---	1	21	7	9	4	220	7	7	276
5	---	5	3	82	385	59	16	19	21	26	616
6	---	---	---	24	28	73	9	63	30	50	277
7	---	2	---	21	12	14	37	15	10	14	125
8	---	49	21	58	91	38	27	168	30	11	493
9	---	11	9	16	38	33	11	2	85	14	219
10	---	4	1	20	21	36	19	3	31	79	214
TOTAL	0	76	42	276	616	277	125	493	219	214	2338

TOTAL MATRIX FOR R 701

(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	---	4	---	---	1	---	---	5
2	---	5	7	3	18	---	1	---	3	3	40
3	---	2	131	50	102	7	4	15	57	14	382
4	---	---	---	30	10	4	3	153	51	9	260
5	4	9	6	93	1976	22	14	1	73	39	2237
6	---	1	1	4	17	29	2	2	5	22	83
7	---	1	1	6	18	1	15	---	1	6	49
8	---	8	84	44	21	2	---	27	5	11	202
9	---	12	147	13	13	4	1	---	81	10	281
10	1	2	5	17	58	14	9	3	5	103	217
TOTAL	5	40	382	260	2237	83	49	202	281	217	3756

TOTAL MATRIX FOR R 702

(Classified as Direct and Average)

CATE- GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	---	1	---	---	---	---	---	1
2	---	---	3	1	1	---	---	2	3	---	10
3	---	1	32	46	55	11	3	17	45	39	249
4	---	---	1	62	10	17	2	167	35	20	314
5	---	---	5	58	423	53	11	21	70	59	700
6	1	---	2	23	24	102	12	66	24	68	322
7	---	---	2	3	13	10	30	3	12	16	89
8	---	4	88	57	66	36	3	586	29	24	893
9	---	5	109	32	53	20	12	2	287	34	554
10	---	---	7	32	54	73	16	29	49	384	644
TOTAL	1	10	249	314	700	322	89	893	554	644	3776

TOTAL MATRIX FOR A 802
(Classified as Direct and Most Direct)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	--	1	1	2	--	--	--	4
2	--	6	--	1	15	--	1	--	--	10	33
3	--	2	8	--	5	--	--	1	2	--	18
4	--	--	--	59	14	3	4	215	1	29	325
5	4	10	2	156	3039	86	106	24	26	88	3541
6	--	--	--	2	54	40	8	36	--	55	195
7	--	1	--	18	109	13	164	9	3	34	351
8	--	4	4	66	171	12	34	181	--	16	488
9	--	3	3	--	34	1	7	--	21	3	72
10	--	7	1	23	99	39	25	22	19	320	555
TOTAL	4	33	18	325	3541	195	351	488	72	555	5582

TOTAL MATRIX FOR A 803

(Classified as Indirect and Most Indirect)

CATEGORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	---	---	---	---	1	---	---	---	---	1	2
2	---	28	7	12	17	4	---	---	8	35	111
3	1	6	75	86	75	4	3	9	35	30	324
4	---	1	3	25	11	3	3	318	24	17	405
5	---	6	5	133	512	24	2	2	78	33	795
6	1	---	2	15	15	29	---	44	14	27	147
7	---	1	1	2	4	4	9	1	---	16	38
8	---	25	124	81	70	40	1	30	26	11	408
9	---	34	104	27	45	12	3	2	70	6	303
10	---	10	3	24	45	27	17	2	48	243	419
TOTAL	2	111	324	405	795	147	38	408	303	419	2952

TOTAL MATRIX FOR C 801

(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	1	3	2	7	--	--	--	1	3	17
2	1	12	7	10	38	1	2	--	9	3	83
3	2	14	127	21	52	--	--	7	26	18	267
4	--	5	1	40	11	1	--	209	12	33	312
5	4	5	4	191	2649	11	14	3	49	36	2966
6	--	--	--	--	1	13	--	1	1	27	43
7	--	--	--	1	10	--	21	4	2	14	52
8	3	35	39	28	119	--	2	40	2	8	276
9	4	9	82	--	23	1	2	--	112	12	245
10	3	2	4	19	56	16	11	12	31	254	408
TOTAL	17	83	267	312	2966	43	52	276	245	408	4669

TOTAL MATRIX FOR D 804

(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	1	---	---	1	6	---	1	---	---	---	9
2	---	4	16	9	10	---	2	1	6	1	49
3	1	11	233	104	88	4	1	20	19	9	490
4	3	---	8	225	43	9	---	311	36	24	659
5	2	6	8	159	1423	23	3	2	47	28	1701
6	---	---	1	5	17	34	---	14	2	24	97
7	---	---	---	4	4	---	1	---	---	---	9
8	1	19	160	96	44	4	1	264	23	6	618
9	1	9	64	35	27	2	---	---	211	5	354
10	---	---	---	21	39	21	---	6	10	165	262
TOTAL	9	49	490	659	1701	97	9	618	354	262	4248

TOTAL MATRIX FOR E 802
(Classified as Direct and Average)

CATEGORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	--	--	--	--	--	--	1	1
2	--	--	3	12	5	11	--	--	6	9	46
3	--	--	--	8	16	1	--	3	6	1	35
4	--	1	--	8	5	5	1	207	37	37	301
5	1	2	1	86	564	97	11	12	86	50	910
6	--	--	--	17	28	102	4	132	41	97	421
7	--	--	--	8	8	10	25	1	13	21	86
8	--	26	22	74	114	58	9	552	56	17	928
9	--	17	9	41	133	61	19	8	95	42	425
10	--	--	--	47	37	76	17	13	85	351	626
TOTAL	1	46	35	301	910	421	86	928	425	626	3779

TOTAL MATRIX FOR G 801
(Classified as Direct and Most Direct)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	1	--	--	--	--	--	--	3	1	5
2	--	1	6	1	6	--	--	1	--	4	19
3	--	--	74	6	49	2	--	1	18	31	181
4	--	2	--	31	8	2	--	86	8	21	158
5	1	--	5	71	1364	36	18	1	63	59	1618
6	--	--	--	2	25	75	13	63	17	53	248
7	--	--	1	2	19	17	65	2	9	66	181
8	--	10	24	15	28	58	4	24	3	13	179
9	4	4	70	13	71	22	11	--	77	19	291
10	--	1	1	17	48	36	70	1	93	305	572
TOTAL	5	19	181	158	1618	248	181	179	291	572	3452

TOTAL MATRIX FOR G 802
(Classified as Direct and Most Direct)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	--	--	--	--	--	--	--	0
2	--	--	--	--	--	--	1	--	--	1	2
3	--	--	10	5	9	3	5	--	14	17	63
4	--	--	2	2	2	9	2	40	14	--	71
5	--	--	--	26	239	35	15	1	37	19	372
6	--	--	--	9	39	155	38	6	49	61	357
7	--	2	1	7	12	42	82	2	42	41	$2\overset{3}{5}1$
8	--	--	1	7	18	9	6	6	7	3	57
9	--	--	46	4	35	46	38	2	54	44	269
10	--	--	3	11	18	58	44	--	52	365	551
TOTAL	0	2	63	71	372	357	231	57	269	551	1973

TOTAL MATRIX FOR H 802
(Classified as Direct and Average)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	3	--	1	1	7	2	--	--	--	1	15
2	2	4	3	6	16	11	--	3	9	16	70
3	1	6	12	19	56	15	--	11	14	3	137
4	--	5	2	26	20	30	3	363	20	25	494
5	4	11	10	171	800	127	13	23	111	56	1326
6	--	4	1	45	62	169	15	123	48	106	573
7	1	--	--	14	15	17	26	6	10	26	115
8	--	17	54	121	216	79	19	223	17	18	764
9	2	18	53	47	97	43	18	1	53	16	348
10	2	5	1	44	37	80	21	11	66	134	401
TOTAL	15	70	137	494	1326	573	115	764	348	401	4243

TOTAL MATRIX FOR I 801
(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	1	--	--	2	6	--	--	1	1	1	12
2	--	5	14	9	23	--	--	--	--	6	57
3	--	15	89	39	55	1	--	3	2	5	209
4	2	--	4	163	31	12	--	167	9	40	428
5	6	7	15	151	1435	24	3	9	4	34	1688
6	--	--	--	4	20	32	--	17	1	22	96
7	--	--	--	--	2	--	--	--	1	--	3
8	2	26	69	33	66	3	--	40	--	7	246
9	--	4	16	3	9	--	--	--	13	2	47
10	1	--	2	24	41	24	--	9	16	125	242
TOTAL	12	57	209	428	1688	96	3	246	47	242	3028

TOTAL MATRIX FOR L 803
(Classified as Direct and Most Direct)

CATEGORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	--	--	--	--	--	1	1	2
2	--	--	6	5	12	5	--	--	1	1	30
3	--	3	5	10	19	4	1	--	7	4	53
4	1	--	--	6	7	3	1	155	7	11	191
5	--	5	--	93	513	49	10	3	41	26	740
6	1	--	--	15	20	43	4	25	14	28	150
7	--	--	--	4	10	3	3	--	1	1	22
8	--	21	21	32	81	12	--	8	10	7	192
9	--	1	20	10	58	15	1	--	20	5	130
10	--	--	1	16	20	16	2	1	28	141	225
TOTAL	2	30	53	191	740	150	22	192	130	225	1735

TOTAL MATRIX FOR M 802

(Classified as Direct and Average)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	--	1	--	--	--	--	--	1
2	--	--	2	17	12	4	1	1	6	4	47
3	--	--	8	66	46	9	1	3	--	3	136
4	--	--	--	35	15	11	3	697	10	31	801
5	1	6	1	214	383	77	5	14	27	35	763
6	--	--	--	40	37	67	7	82	24	64	321
7	--	1	--	9	5	6	5	4	5	7	42
8	--	30	124	342	184	72	10	31	9	44	846
9	--	7	--	36	64	27	3	--	20	11	168
10	--	3	1	42	16	48	8	14	67	97	296
TOTAL	1	47	136	801	763	321	42	846	168	296	3421

TOTAL MATRIX FOR M 805

(Classified as Indirect and Average)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	1	7	--	--	--	--	1	9
2	--	--	15	9	19	1	--	1	2	--	47
3	1	9	45	82	107	5	1	7	8	4	269
4	--	3	--	101	29	12	4	373	24	49	595
5	7	5	12	229	712	51	9	3	38	40	1106
6	--	--	1	12	29	42	4	26	11	47	172
7	--	1	1	8	11	9	15	3	1	10	59
8	1	27	179	83	97	11	11	34	4	6	453
9	--	1	14	17	58	15	1	--	28	9	143
10	--	1	2	53	37	26	14	6	27	153	319
TOTAL	9	47	269	595	1106	172	59	453	143	319	3172

TOTAL MATRIX FOR P 805
(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	2	2	1	--	--	--	--	5
2	--	2	8	12	18	1	--	--	--	--	41
3	--	7	28	38	53	--	--	9	1	1	137
4	2	3	1	127	42	3	1	268	2	24	473
5	3	2	3	209	1543	25	1	3	6	31	1826
6	--	--	--	5	21	16	--	1	--	12	55
7	--	--	--	4	1	1	3	1	--	4	14
8	--	27	89	55	107	1	5	29	1	3	317
9	--	--	7	--	6	--	--	--	1	--	14
10	--	--	1	21	33	7	4	6	3	173	248
TOTAL	5	41	137	473	1826	55	14	317	14	248	3130

TOTAL MATRIX FOR T 802
(Classified as Direct and Most Direct)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	--	5	--	--	--	--	--	1
2	--	--	--	2	2	--	--	1	5	2	12
3	--	1	10	14	22	--	2	2	15	3	69
4	--	--	--	16	15	10	--	196	86	39	362
5	1	--	4	155	1717	27	27	8	112	59	2110
6	--	--	--	6	19	27	8	17	7	22	106
7	--	--	--	21	25	5	121	4	17	17	210
8	--	5	17	84	92	8	12	49	9	15	291
9	--	5	35	30	161	13	20	1	108	12	385
10	--	1	3	34	56	16	20	13	26	182	351
TOTAL	1	12	69	362	2110	106	210	291	385	351	3897

TOTAL MATRIX FOR V 803
(Classified as Indirect and Most Indirect)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	--	--	--	1	1	--	--	--	--	2	4
2	--	1	4	11	15	6	--	1	8	16	62
3	--	6	168	42	107	8	4	11	39	34	419
4	--	1	2	41	9	4	--	288	14	34	393
5	--	2	9	154	1740	73	12	1	90	23	2104
6	--	--	1	6	36	87	3	55	20	64	272
7	--	--	1	12	9	1	26	3	12	17	81
8	1	32	97	90	97	33	8	93	22	8	481
9	2	19	134	11	52	16	17	2	216	22	491
10	1	1	3	25	38	44	11	27	70	376	596
TOTAL	4	62	419	393	2104	272	81	481	491	596	4903

TOTAL MATRIX FOR V 804

(Classified as Direct and Average)

CATE-GORY	1	2	3	4	5	6	7	8	9	10	TOTAL
1	1	--	--	2	2	--	--	1	1	1	8
2	--	18	6	10	19	6	1	2	3	24	89
3	1	3	47	26	46	6	3	11	15	10	168
4	1	2	--	39	25	12	14	255	5	61	414
5	2	9	--	155	1621	57	29	6	16	86	1981
6	--	1	--	13	29	228	14	98	2	72	457
7	--	2	1	28	43	17	125	12	5	53	286
8	1	25	83	77	87	71	45	103	3	19	514
9	--	5	30	5	17	4	12	--	39	6	118
10	2	24	1	59	92	56	43	26	29	278	610
TOTAL	8	89	168	414	1981	457	286	514	118	610	4645